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WATER AND PEACE FOR THE PEOPLE

POSSIBLE SOLUTIONS TO WATER DISPUTES IN THE MIDDLE EAST

Jon Martin Trondalen

Water and Conflict Resolution Series - **UNESCO-IHP**

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COMPASS

United Nations
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Cultural Organization

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To the people in the region
who are longing for water and peace.

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All the people mentioned above are part of any success of this publication, but have no responsibility for any failures, unintended misrepresentation, or errors in this book.

Table of contents

This book presents a compelling case for water as a source of co-operation in an area that is otherwise loaded with conflicts.

Dr. Trondalen, a seasoned veteran of multilateral peace talks on water in the Middle East, offers comprehensive solutions in which water connects rather than divides. Just as in nature, one could argue. This is a major work that will hopefully be an eye-opener for all concerned: politicians, water experts and, most importantly, the people of the region. Peaceful solutions do exist and could serve everybody's interests, provided there is the will to find them.

This is the first publication in the International Hydrological Programme's new series on 'Water and Conflict Resolution'. It is an important contribution to UNESCO's paramount mandate, to nurture the idea of peace in human minds.

Andras Szollosi-Nagy
Secretary of the International Hydrological Programme
Director, Division of Water Sciences
UNESCO

List of abbreviations

AIC	Actual incremental costs
CESAR	Centre for Environmental Studies and Resource Management
CFR	Compensation for foregone resettlement
COWI	International consulting group
CSD	Commission on Sustainable Development
DOP	Declaration of Principles
DMZ	De-militarized zones
EAWAG	Swiss Federal Institute of Aquatic Science and Technology
EBSAP	Ecological Benefits Strategic Assessment Plan
ETI	Euphrates and Tigris Basins Initiative
ETI-TF	Euphrates and Tigris Basins Initiative Trust Fund
EU	European Union
FAO	United Nations Food and Agricultural Organization
GEF	Global Environment Facility
GS	Gaza Strip
GWMS	Golan Heights Water Resource Monitoring System
GAP	Southeastern Anatolia Development Project [Turkish: Güneydoğu Anadolu Projesi]
GWh	Gigawatt hour
ICARD	International Center for Agricultural Research in the Dry Areas
ISA	Incremental step approach
JSET	Joint Supervising and Enforcement Teams
JTC	Joint Technical Committee
JWC	Joint Water Commission
MCM	Million cubic metres
MIC	Maximum incremental costs
NAFTA	North American Free Trade Agreement
NBI	Nile Basin Initiative
NGO	Non-governmental organization
NSC	National Security Council
O&M	Operation and maintenance
OECD	Organisation for Economic Co-operation and Development
PA	Palestinian Authority
PLO	Palestine Liberation Organization
PWA	Palestinian Water Authority

RWMO	Regional Water Management Organization
SAP	Subsidiary Action Programme
SIWI	Stockholm International Water Institute
SVP	Shared Vision Programme
TBSAP	Tigris Basin Subsidiary Action Programme
TDS	Total dissolved solids (expression for the dissolved minerals in the water - TDS impact on water)
TF	Trust fund
TPCM	Third party compensation mechanism
UN	United Nations
UNDOF	United Nations Disengagement Observer Force
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNIFIL	United Nations Interim Force in Lebanon
US	United States
WB	West Bank
WBGS	West Bank and Gaza Strip
UNCED	United Nations Conference on Environment and Development
UNFCCC	United Nations Framework Convention on Climate Change
UNCUIW	United Nations Convention on the Law of the Non-navigational Uses of International Watercourses (often called UN Water Convention)
UNTSO	United Nations Truce Supervision Organization
UNECE	United Nations Economic Commission for Europe
UNESCWA	United Nations Economic and Social Commission of Western Asia
WGWR	Working Group on Water Resources

Explanation of terms

- 'Dispute' is used synonymously with 'conflict'.
- 'Parties' refers to Turkey, Syria, Iraq, Lebanon, Israel and the Palestinian Authority – in some cases meaning only some of them.
- 'Palestinian Authority' (PA) refers to the formal Palestinian Authority (PA) as defined by the PLO (DOP, 1993).
- A 'river system' comprises both the main course and each of the tributaries that feed into it. The area drained by the river system is known as the 'catchment' or 'watercourse'.
- 'Basin' is used synonymously with 'watershed', 'catchment' or 'watercourse'.
- An 'aquifer' is considered to be any water-bearing or aquiferous stratum.
- 'International water resources/watercourses' is preferred over 'shared international water resources'.
- A 'water management regime' is a water arrangement that specifies the use of water flow according to certain timescales and water quality specifications.
- 'Return-flow' refers to the drainage water from irrigated land that could go to surface- and groundwater (compared to 'runoff' which is natural drainage).
- 'Bargaining' addresses the positions of the Parties, while 'interest-based negotiation' addresses the real interests or concerns of the Parties.
- 'Conflict management' comprises prevention, avoidance, settlement and resolution.
- 'Sustainable governance' in this context means sustainable solutions to management of international watercourses.
- The lake in the Upper Jordan River Basin is referred to as Lake Tiberias (also known as Lake Kinneret or the Sea of Galilee, a Biblical expression).
- The contemporary expression of the geographic area of the West Bank is used instead of the Jewish expression of Judea and Samaria, which includes a larger area.
- Some names have different spellings, such as Hasbani, Hasbanye or Hasbanya (termed *Snir* by Israel). As far as possible, the most common names in the English literature are applied.
- 'Virtual' or 'invisible' water refers to water that may be substituted, for example by importing food that would have required national water if produced locally.

Various 'water monitoring and verification systems' are proposed, using the following concepts:

- 'Monitoring': the systematic surveillance and measurement of defined parameters.
- 'Verification': confirmation, by examination and provision of objective evidence, that results have been achieved or that specific requirements have been fulfilled (or status of requirements).
- 'Auditing': a systematic, independent and documented process for obtaining evidence and evaluating it against agreed-upon, pre-set criteria.
- The 'rule curve': a function that defines the use of water – either for power production or for irrigation.

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Preface

This publication not only presents information about, but proposes possible remedies to, the serious challenges faced by countries in managing their international water resources in the Middle East. International water conflicts are becoming more entrenched, and unless solutions are found the whole region will face even more serious water problems than today. In the foreseeable future, this may threaten the already fragile stability in the Middle East.

Demand for water in the region is constantly increasing. This is due to the combination of rapid population growth and a steady social and economic development that is incommensurable with existing natural water resources. It is therefore easy to overexploit and pollute the waters at the expense of coming generations. Water disputes in the region are hindering effective water use as well as fuelling political flames that have already been lit.

Some may say that the political questions should be settled first, with water disputes being addressed afterwards. However, water is such a valuable and basic human need that countries have an intergenerational duty to solve the problems relating to it. Such an obligation is also rooted in the three monotheistic religions – Judaism, Christianity and Islam.

Remedies to the water disputes in the Middle East are a long-term imperative. Conciliation between countries should not be destroyed by such disputes. Indeed, providing water and peace to the people, and especially for the poorest, is far more important than short-term political schisms, however entrenched.

Therefore, despite the limitations of the outlined proposals, this book offers at least some ways out in order to grant people access to water for drinking and food security.

Background

Hope for peace and prosperity has gradually vanished over recent years for most of the people in the region. They have learnt that governments are hard to trust and that dwindling natural resources are becoming scarce. History has also revealed that unless hope and some degree of trust are built up, no progress will be made.

In principle, each country could adopt a unilateral approach to managing sovereign natural resources such as water. Unfortunately, reality is less simple. Many of the contested waters cross borders that require some sort of jointly agreed-on arrangement. Since all Member States of the United Nations have signed several international environmental protocols and conventions, they have also accepted that issues such as transboundary water pollution must be tackled in co-operation.

The discussion and fight over water resources can provoke hostile relationships between countries. However, they also offer an opportunity for nations to co-operate and build cross-border confidence,

Map 1. Middle East region

in order to safeguard a basic need for their peoples and guide the usage of one of the most precious natural resources.

Conflicts over dwindling water resources in the Middle East are not new. Indeed, references to them date back as far as the Scriptures shared among Muslims, Jews and Christians. According to Genesis, Chapter 26, the two wells in the land of the Philistines were eventually called Strife and Hatred.

This publication deals with sensitive political, religious, cultural, social, economic and environmental matters. It may merely be considered as a good non-partisan effort, but some considerations should be taken into account:

- the results of the studies and many of the main elements in the proposals have evolved over several years, but were not made public previously as this was not considered conducive to finding common ground;
- the intent is to offer solutions from a non-partisan perspective that might otherwise have been perceived as one-sided if given by one of the Parties or by other concerned stakeholders; and
- the combining of epistemic work with actual engagement in processes, negotiations and even concrete projects has led to the conviction that the solutions to the disputes are to harmonize the interests of the Parties,[I] and that an explanation of the stated disputes cannot be found in a single discipline – in fact a single disciplinary approach is incorrect[II].

I. As also expressed by the French diplomat, Francois de Calliéres (de Calliéres, 2002).

II. The author is well aware that an interdisciplinary approach runs the "risk of attracting the very sharp and even destructive analysis of elements of… [its] arguments by scientists with more specific disciplinary expertise in a particular episteme. In taking the scientifically hazardous interdisciplinary road one must be prepared for the ambushes of the scientifically well armed" (Allan, 2002: 21). However, this publication aims to offer realistic solutions that cannot be limited to a single discipline. See also Gjessing (2002).

There is a degree of uncertainty as regards the timing of the publication due to the unpredictability of events in the region. In any case, the need to manage the precious water resources and proposals are valid irrespective of the ebb and flow of politics.

Recent events

Since the manuscript of this book was completed at the beginning of 2006, dramatic events have taken place in the region. These include the increased hostilities between Israelis and Palestinians in Gaza; the Hamas overtaking of Gaza; and Hezbollah's subsequent targeting of Israeli soldiers at their common border with the ensuing skirmishes escalating into violent and warlike damage to humans and infrastructure. The latter event prompted a revised mandate of the UN Peacekeeping Mission, UNIFIL, in Southern Lebanon in the Upper Jordan Basin.

These events are important and dramatic. However, they do not change the basic diagnosis of the water conflicts, or the proposed solutions. On the contrary, they underline the importance of removing the causes of tension and conflict by proposing sustainable solutions.

Facilitating and building consensus among the parties

Crafting dialogue and understanding

Very little information is provided on how the crafting of dialogue, facilitation and understanding was carried out. This is first and foremost because such issues might draw public attention at the expense of the substance of the book. Secondly, the involvement of colleagues and partners is a sensitive issue, and the confidentiality of such processes should be respected. However, I discuss briefly below some of my involvement in dialogue and facilitation.

Lessons learned

The relationships between the countries of the Middle East are expressed in certain ways. One of these is the political drama, where rhetoric and various types of influence groups dominate. People outside the region often misinterpret such communication and assume that the status of relationships reflects the degree of tension in statements. One must therefore be aware that the political rhetoric sometime runs so high that it is hard to understand what is really going on.

There is, however, another layer of communication. This is often overlooked and consists of a constant flow of information between varying factions, constituencies and nations. Some of these channels, often named 'tracks', are public-diplomacy or 'behind-the-scene' initiatives. In some instances, leaders have one public channel of communication in addition to several secret or non-public ones. Quite often, the latter are characterized or supported by so-called 'track-two diplomatic approaches' where 'disinterested' diplomats, in collaboration with business leaders, scientists or other experts, craft channels of communication between the Parties.

I have worked primarily as a so-called 'impartial' or 'unbiased' expert, in the sense that I have not had any hidden personal, political or other agendas. In a politically-charged region such as the Middle East, it is obvious that what takes place behind the scenes should mostly remain there. Contrary to common belief, the main reason for this is not that clandestine activities or transactions are taking place. Rather, it is that certain issues are better dealt with in confined circles. Equally important, the individuals involved have a right to confidentiality. In some sensitive geographical, political and religious areas, such activities may even constitute a real danger not only to the process itself, but also to individuals' personal security.

Many facilitators, mediators and negotiators are therefore quite reluctant to outline how and with whom they work. I subscribe to such a discreet approach, and have in only two instances published experiences in setting up, facilitating and chairing talks in the Middle East. These include the process that led to the first trilateral water agreement in the Middle East – the so-called Declaration of Principles for Co-operation on Water-related Matters and New and Additional Water Resources of 1996 (see Trolldalen [Trondalen], 1997) – and a manual on dispute resolution (written for UNESCWA, Trondalen, 2004a).

Do personal experiences as a negotiator have a value for others?

Although it is quite common for envoys with a high public profile to publish their experience and lessons learnt, the value of these personal experiences for others is not always clear. This also applies to myself. However, as observers have challenged me to shed light on my experience working with the four disputes outlined in the book, a number of selected reflections are highlighted below.

Any experienced negotiator has found his/her way of working through dedication, loyalty, empathy, analytical skills, knowledge and the ability to handle stress. There are no panaceas for resolving international water disputes. However, some lessons that may be applicable are like common denominators in an equation, which you must strive to find in order to improve your own performance and that of your delegation.

One may wonder whether a successful negotiator always gets what she/he wants – irrespective of circumstances. Some observers may have a clear answer; I do not, simply because success is hard to define. Both success and common errors are briefly discussed below:

Some workable principles in setting up and developing a process

In many ways, the crafting of a process is an expression of both an explicit attitude (and values) and a modus operandi. In the two publications, the author focused on the following principles:

- understanding of and sensitivity to the political and cultural context of the dispute;
- problem identification and understanding of positions and interests, to be carried out prior to and during the negotiations (such as: What are the main questions? What data do we need to answer those questions, and how reliable and valid are these data?);

- development of a common understanding of collective concerns. This requires some basic understanding of the core issues, or at least a willingness to clarify them;
- providing information and data for an interest-based negotiation (versus bargaining process);
- establishing official contacts at a certain stage in the process, i.e. legitimizing efforts in a diplomatic context by 'track-two' bridging with other diplomatic approaches;
- mobilizing existing experience through government agencies, resource people and non-governmental organizations (NGOs); and
- involving the public. This can be quite difficult as the processes are not by nature 'open' and transparent. However, experience in the region has shown that lack of public ownership of agreements may severely hamper implementation.

Some lessons for delegates

Selected condensed and simplified lessons learnt for negotiations are listed below:

- Although not entirely obvious when delegates are in the middle of a tense negotiation, it is important to clarify interests, not positions. This does not mean that tactical points should be given away, but rather that the other Party should be guided towards solutions that are more important for your Party's interest.
- In practical terms, this means that a delegate must constantly develop her or his options and consider those of others. Any experienced negotiator will intuitively devise options for mutual benefit, simply because this is where the solutions are.
- An obvious lesson, but still hard to apply, is distinguishing between people and their constituencies. Many scholars argue hard for this point, but I am somewhat more pragmatic in my dealings. A skilled negotiator is able to convey his/her country's point of view in such a way that the other Party is constantly challenged by this distinction. Delegates may be able to act respectfully without jeopardizing their own country's interests.
- This leads to the next and obvious point – treat people with respect – irrespective of the circumstances.
- One of the best ways for a delegate to avoid the most obvious pitfalls is by improving his or her understanding of the other Party's cultural background and psychological frame of mind.
- In any case, a delegate must mentally process simultaneously a set of technical, political, diplomatic and emotional issues. This is demanding, and sometimes the pressure will make it even harder. (For a more in-depth discussion, see Trondalen, 2004a).

Common errors

Common errors are sometimes easier to identify than successes. Irrespective of political, cultural, political and technical complexity, at least four major findings are applicable to a negotiator and to a delegation as a whole:

- not listening to the other Party(ies), especially when the talks are getting tense. Equally detrimental is not showing that you are listening;
- focusing on positions; ignoring interests. This sounds easy, but is very hard in real negotiations. In everyday conversations, very few people make an explicit distinction between what is said and what is really behind the phrases. Any skilful negotiator will achieve this decisive ability;

- lack of knowledge of the particular subject or related issues is also, unfortunately, typical. The consequences of this are in most cases disastrous in terms of reaching an agreement. Most unskilled negotiators will block proposals and develop a defensive and reactive behavioural approach;
- limiting options (inventing vs. deciding) is often a consequence of the latter point. However, a delegate may have substantial knowledge about the matter, but not the right mindset. Inventing options is more about attitude than technical understanding. If the head of a delegation or anyone on the team has neither the power nor ability to invent/decide on options, they will probably not reach a solution unless the negotiations are taking place over an exceptionally long time (probably years rather than months).

What can change a gridlocked situation between watercourse countries?

There are hardly any panaceas for changing gridlocked situations, especially in the Middle East. The following techniques are often advocated in more academic literature, but I have also experienced their usefulness first-hand:

- new substantive information – or rather, new information provided to key decision-makers;
- new trade-offs between two or more of them;
- a changed general political climate or relationships; and
- new external power brokers (extra-regional Parties).

Quite often, the broader conditions are beyond the influence of negotiators and delegates. An interesting question becomes: What underestimated factors hamper progress?

Underestimated factors in international water negotiations

- The role of an individual negotiator: Experience has shown that 'able negotiatiors are able to negotiate'. Indeed, discussions on 'smart', 'hard or tough', or even 'soft' negotiators is of more academic than practical value. Negotiators that both understand the substance and have talents in dealing with complex issues as well as personal relationships are – without a doubt – the best envoys for the respective Parties.
- In many instances, the delegates should possess satisfactory bargaining power: A too-strict mandate often hinders new perspectives and development of options.
- In addition, the format and setting of the meeting: where it takes place, and under what kind of circumstances. Practical factors ensuring that the meeting will take place under secure and confidential conditions have been proven to be surprisingly important. They include in which country (a 'neutral' one) the meeting is held, at what time, whether there is accommodation close to the negotiating tables, etc. In this respect, the facilitator/mediator must be sensitive to the delegates' personal well-being (even on issues like family considerations and safety).

Reservations

Despite the attempt to crystallize some lessons learnt, my experience is that a general humbleness to the sheer complexity of the relevant water disputes, peoples and political concerns, limited realistic options and financial constraints is not only wise, but necessary for fostering sustainable

solutions. Quick-fixing may provide short-lived rewards, but long-term agony for the people in the region could be the final outcome of such an approach.

The suggested solutions to the four water disputes should be viewed as an effort to incorporate the lessons and make a contribution that could foster sustainable water management while addressing the concerns of the people.

Water and peace for the people

In 1997 in Iraq, I met Abdullah, a farmer living in a village on the riverside at Al Hilla (in the ancient city of Babylon, 100 km south of Baghdad), close to the Euphrates River. He showed me the salt layer on the topsoil that was destroying his field – a plot his forefathers had cultivated for centuries. Together with his countrymen and women, he was tired of bearing the burden of the international sanctions against Iraq. He asked only for a small pump in order to get rid of the drainage water that could save the land of his village (in 1997, UN sanctions did not allow for the easy import of pumps).

■ Photo 1.
An irrigation channel on the plain east of the Euphrates River in Mesopotamia.

■ Photo 2.
A water pump in Gaza

In the Gaza Strip, Nasser painstakingly cares for his precious pump, which provides water for a small vegetable garden behind his house. Despite the salty taste, his family drinks the water from the aquifer situated under the Gaza Strip. Yet Nasser lives in constant fear, as he can only run the pump at night. This is because it is one of the thousands of so-called 'black wells' in Gaza, an unauthorized well beyond the control of the Palestinian Authority. "What kind of options do I have?", he asked me, "I was hard pressed! I have a family as well!".

In Israel, in the Upper Jordan River just before it reaches Lake Tiberias, the figures were convincing, the data was reliable and the conclusions were conclusive. Avi – the dedicated scholar – gave me the hard facts: Unless the sensitive hydro-ecological Lake Kinneret and the mountain aquifer are protected, Israel will face a water crisis beyond imaginable dimensions. The country will simply dry out. He goes on to describe how they are turning to manufacturing water and reducing water consumed by the agricultural sector. Desalinized water from the Mediterranean is one of the scant options in order to secure water for his growing nation.

■ Photo 3.
The Jordan River just before it reaches Lake Tiberias

In Turkey, close to what religious texts refer to as the birthplace of the Patriarch Abraham, near the Euphrates River on the plains of Sanliurfa in the south-eastern part of Turkey, Suleiman was obviously very pleased that his village could finally make full use of the richness of the soil to double, and even triple, agricultural production. He considered that the central government was paying attention to the concerns of his village and family, after having been backlogged for decades. Now, huge hydropower installations not only benefited the people in the area, but also responded to the rest of the country's increased demand for energy and food. He was proud of his country's accomplishments, which I could readily understand.

Photo 4.
An ancient building in *Al Hilla* of the old Babylon

In Southern Lebanon, in the not-so-distant past, there were armed clashes in the area around the village of Amid. Today, however, his extended family, living in the picturesque landscape in the southern part of Lebanon, is benefiting from calm conditions as they wait for the new water pipe to be installed, so that drinking water and agricultural production may develop. He admits that they all are tired of political strife and simply want a little water in order to sustain their daily life and live peacefully – finally, after all these years.

Photo 5.
Water pipes at the Wazzani Springs in southern Lebanon

In Syria, higher up on the Euphrates River, Adnan, a young engineer at the new Thesreen dam project in Syria, showed me around the dam site under construction. He knew he was part of a national effort to improve the efficiency with which the water of the Euphrates was used, for the benefit of people in the major cities and for agriculture. The area suffered from lowering of the groundwater and an increasing number of dry wells. The rapidly growing city of Aleppo, in the vicinity, was struggling to maintain a clean water supply. Adnan told me that there were plans to supply Damascus with drinking water from the river. He felt privileged to be a part of one of the major engineering works in his country.

Photo 6.
The fertile plains outside Aleppo in Syria

Executive summary

The book is divided into three sections. It pinpoints some of the current water conflicts, stressing their gravity and magnitude, but more importantly outlining principles and procedures for solving them.

- **Section I** is divided into two parts. The first deals with the dispute related to the Golan Heights and Upper Jordan River Basins involving Syria and Israel, while the second deals with the more recent Wazzani Spring dispute between Israel and Lebanon.
- **Section II** is quite different in nature, dealing with the water dispute between the Palestinians and the Israelis.
- **Section III** deals with the challenges faced by Turkey, Syria and Iraq in managing the Euphrates and Tigris Rivers.

Some may argue that each of the four disputes should be assessed together, in the sense that water could be transferred from one basin to another. I do not take this view, simply because the political setting – for the time being and in the near future – is not conducive to such proposals.

Introduction

Before turning to the four disputes, and in an attempt to explore overall and universal reference points applicable to the prevention and resolution of water disputes, some background, methods and policies are set out below.

Reference points in the discussion on water disputes in the Middle East

Over thousands of years, everyday problems in the Middle East have demanded urgent solutions – quite often with a dramatic outfall of historic proportions. For people living there and for outsiders, the waves of political events often reduce their perspectives and demand urgent actions.

Water has played its part in the historic web – for good and for bad. It remains at the centre stage of the daily life of people as well as in the relationship between nations, and gives a way to hope. However, there are some new traits in water management, some of which are alarming even within the perspective of one generation.

This publication aims to incorporate the constraints and opportunities in the proposed solutions to some of the most pressing water disputes in the region. It is important to understand that the causes of the conflicts are many and complex, and that any solutions should be presented with the utmost caution and reservations. The danger is that solutions will be outlined that are too associated with the point on the timeline and not in an intergenerational perspective, from which any water management should be viewed.[1]

The key problem, however, appears to be how to enlarge the pie rather than try to enlarge one of the pieces at the expense of another Party.

The proposals to the disputes outlined aim to incorporate the hard facts on the ground. Half of the urban populations in the larger cities in the region do not have adequate drinking water facilities. Moreover, pollution of surface and underground water is rapidly developing, a problem for which the governments do not have proper remedies. Lack of agreement between the Parties hinders the effective and fair use of resources, leading to short-term and temporary solutions.

...creating a gap between the reality at the negotiation table and the reality on the ground has been a mistake in many past efforts...

Lessons learnt from deliberations with the Parties[2] have shown that creating a gap between the reality at the negotiation table among leaders and the reality on the ground – even among the enlightened public – has been a mistake in many past efforts.[3] Experience has shown that in the course of the political rhetoric, the public has sometimes not been given a picture of what might be realistic and what may even be factually incorrect information. This publication attempts to promote moderate positions in situations where every contester wants a larger piece of the pie than might be physically feasible. The key

problem, however, appears to be how to enlarge the pie rather than try to enlarge one of the pieces at the expense of another Party.

Historic lines

Three basic historic lines appear to be of importance in proposing solutions to the water conflicts. A Biblical perspective cannot be isolated from contemporary history. However, in the search for solutions, current statehoods and borders as well as international agreements and water practices seem to be of more significance.

The first line is characterized by the recent centuries of water management of the major rivers and aquifers, which has occurred with few changes. During the Turkish Ottoman era (around 1570-1920), all of the current 'four disputed waters' were handled by the institutions under Turkish control and management. Except for a general shortage of water and more or less regular annual acute scarcity, the disputes were solved by the administration at the level of the Governor, or even among villages and cities.

The second line began *circa* 1923 with the establishment of the contemporary Arab nations as we more or less know them today and the founding of the State of Israel in 1948. Then, in 1967, as a result of the Arab-Israeli war with the subsequent annexations by Israel of the Gaza Strip from Egypt, the Golan Heights from Syria and the West Bank from Jordan, borders were created that form a central part of the disputes.

The third line encompasses the intervention in Iraq by an international coalition in January 1991 and, subsequently, the invasion of March 2003. The present Iraqi-US relationship is expected to influence not only internal Iraqi affairs, but also its relationship with other countries in the region. This situation has created a geopolitical situation of particular significance for any agreement to jointly manage the Euphrates and Tigris Rivers.

Neither of the conflicts can be understood and therefore resolved unless these historic lines and political realities are accepted. Most people take a normative point of view on some of these events. This publication does not belong to an unreal world that pretends that these events are not disputed. Rather, it argues that the solutions to the water disputes are to be found in mirroring the past with current political opportunities rather than constraints.

Today's situation

Unfortunately, water issues cannot be detached from current and protracted political events in the region (see Allan, 2002: 242 who also refers to Lowi, 1990: 375, Shapland, 1997 and Turton, 1997: 32). The situation today is grave, and will be even worse tomorrow unless political events take a rapid and positive turn. This is because scientists have demonstrated that the Middle East will be the first region in history to run out of water (Allan, 2002: 9; Rogers, 1994; and Allan, 1994). As one of the most renowned international water experts phrased it: "Meanwhile, the peoples and their leaders in the region refuse to recognise these resource and economic realities.

Their interpretations of Middle East hydrological and economic contexts are at best underinformed and at worst dangerous; their perception of global hydrological and economic contexts is unsafe" (Allan, 2002: 9).

The Middle East will be the first region in history to run out of water.

This publication argues that there are ways out of this situation. However, they require action to be taken by the Parties involved and the international community. Some commonly accepted international water management principles that will be applied in proposing solutions are therefore outlined below.

Transforming policy into concrete strategies[III]

Principles of water management are hard to agree upon, especially if they are concrete enough to have an operational meaning. Vague policy concepts may prove useful academically, but in the reality of the Middle East have hardly any value. Much effort has been put into policy development and the design of international principles, yet very little into the translation of those principles into concrete and lasting governance. There is indeed no shortage of well-developed policies and legislative frameworks. The problem is rather that countries apply these policies and principles according to what serves their tactical and strategic interests. Some of them are listed below:

1. International water laws, such as the UN's Convention on the Law of the Non-navigational Use of International Watercourses[4] and the Helsinki Rules. The first (which is still not ratified) is the most quoted by the international legal community.[5] Despite the weakness of these legal instruments, they are considered to contain the most important principles in managing international watercourses.
2. Other international water agreements in specific regions (such as for the UN ESCWA Region) are setting precedence for future ones (including customary law). International law, in general, and environmental laws specifically include emerging codes of conduct, declarations, protocols and conventions in global environmental matters. The UNCED meeting in Rio de Janeiro in 1992 (UN Conference on Environment and Development) and more recently the Johannesburg Summit with its UN Commission on Sustainable Development (CSD) affirmed relevant principles in order to achieve sustainable development at the local, national and international levels[6].
3. Regional agreements and legislation, as in the European Union, Organisation for Economic Co-operation and Development (OECD) and North American Free Trade Agreement (NAFTA), from which we may draw lessons transferable to the Middle East. These may include guidelines developed by international institutions such as the Operational Directives of the World Bank and other regional development banks, which set a code of conduct for international water management.

Many nations adhere to these principles. However, when the stakes are high enough, legal tools are often applied both ways. For example, the notion of 'equitable utilization' set out in the UN Framework Convention on the Law of the Non-navigational Uses of International Watercourses can 'conveniently' be applied to countries situated both upstream and downstream in a river basin.

III See also Trondalen, 2004a.

Special water arrangements for the Middle East?

Contrary to some observers dealing with international water management, I argue that sustainable governance of most water resources is a matter of complex political sensitivities, especially in the Middle East. Ready-made regional co-operative models of water management are therefore not directly applicable to every geographical, political, economic and social setting.

Special arrangements should thus be developed. There are several reasons for this. Each country has its own history in using a particular international water resource; quite often, the internal political situation is such that water usage may change. In addition, strained and other inflexible relationships with neighbouring countries call for a constant search for applicable principles – so-called 'yardsticks' that can be used in developing common understanding. Finally, each existing water agreement in the region is tailored to the specific physical and political conditions.

Some would argue that a single approach to resolution should be applied in all of the four cases. However, in practice this has proven to be very difficult. There are, of course, some economic and legal yardsticks applicable to all four cases. However, the emphasis should be different due to the specificity of the conditions stated above.

What kind of yardsticks may be applied in sustainable governance of international watercourses in the Middle East?[IV]

In some cases, countries share and allocate international water resources in the spirit of 'good neighbourliness', 'equitable utilization', and even 'non-appreciable harm'. The academic literature records several success stories, especially in Europe and even in more complex areas such as the Mekong Basin in Indo-China and the Indus Basin (Kammerud, 1997). It therefore seems wise to look at some experiences from other parts of the world that may provide us with some clues as to how things may work out in the region.

Management of international watercourses offers unique opportunities for co-operation between the states concerned. Notably, 158 of the world's 263 international basins lack any type of co-operative management framework. Furthermore, of the 106 basins with water institutions (that are in charge in one way or another of a basin), approximately two thirds have three or more riparian states, yet less than 20 per cent of the accompanying agreements are multilateral. Despite the recent progress noted above, treaties with substantive references to water quality management, monitoring and evaluation, conflict resolution, public participation and flexible allocation methods remain in the minority. As a result, most existing international water agreements continue to lack the tools necessary to promote long-term, sustainable governance of water management (see also Wolf, Natharius and Danielson, 1999).

Management of international watercourses offers unique opportunities for co-operation between the states concerned.

IV Derived from Trondalen, 2004a.

Sustainable management of international watercourses can be discussed from various perspectives. Traditionally, water disputes are analyzed from either an upstream or a downstream perspective. In practice, however, an interest-based perspective is quite different from the conventional upstream-downstream doctrine. This more pragmatic – and possibly more contemporary – viewpoint overweighs the earlier approach, and is based on the concept of sustainable development (as utilized in Trondalen and Munasinghe, 1999). It relies on the balanced application of three of the most important principles in dealing with international resources: social equity; economic efficiency; and environmental protection (including public health).

These widely accepted principles also have implications for activities in other sectors that use natural resources, such as energy, trade, tourism and transport.[7] For most complex watercourses, any mechanism must be simple in application, but thoroughly developed in its economic, social and political contexts.

Before discussing these principles in more detail, the development that has led to international acceptance – including by countries in the Middle East – of these principles is outlined below.

Historical development of internationally accepted principles[v]

National and international environmental and resource management problems were first put on the international agenda at the United Nations' Stockholm Environmental Conference in 1972. Since that time, the international community, national authorities and local groups have frequently discussed environmental problems, often in view of sustainable development. The World Commission for Environment and Development or so-called 'Brundtland Commission' of 1987 is first and foremost highly regarded due to its achievement of worldwide acceptance of the notion of 'sustainable development'.

As a result of the universal acceptance of this concept, the United Nations organized the largest conference of its kind on environment and development: the United Nations Conference on Environment and Development (UNCED) that took place in Rio de Janeiro in 1992. All of the members of the United Nations accepted a document called AGENDA 21, which recommended, among others, four main principles in order to achieve sustainable development at the local, national and international levels.

These principles are:

1. the polluter pays principle;
2. the precautionary principle;
3. the principle of national responsibility for transboundary pollution (including subsequent compensation); and
4. the principle of institutionalized or mandatory environmental impact assessment.

v Trondalen and Munasinge, 1999.

All four principles have been embedded in several recent major international environmental conventions, such as the Basel Convention (international transportation of hazardous materials), Montreal Protocol (protection of the ozone layer), Forestry Protocol and most importantly the UN Framework Convention on Climatic Change (UNFCCC)[VI].

These widely accepted international principles have implications for activities in other international sectors that use natural resources such as water, energy, trade, tourism and transportation.

In parallel to the deliberations for the protection of the ozone layer, Forestry Protocol and UNFCCC, the UN drafted the Convention on the Law of the Non-navigational Uses of International Watercourses. This latter includes the purpose of these widely accepted international principles, although three major upstream states – China, Turkey and Burundi – voted against the convention.

The principles

In terms of extracting relevant principles for water management from the widely accepted principles of the existing international environmental agreements, the Water Convention (UNCUIW) and UNFCCC are perhaps of most interest. The precautionary principle is interpreted here to mean that lack of knowledge is not a valid reason for inaction, especially if such inaction entails potentially disastrous consequences. The polluter pays principle is recognized by urging the watercourse countries to shoulder the burden of the response strategy.

At first, the complementary principle prohibiting pollution and assigning responsibility was limited to the protection of the territory and the resources of other nations. They were later extended to cover protection of the marine environment in general, including the 'high seas'. More recently, they have been extended to cover the protection of common areas, resources and the environment as a whole.

What is of interest in the field of international waterways is that the principles relating to liability for environmental damage caused seems to be developing significantly, and the damage does not need to be of a direct economic nature in order to attribute responsibility. A general requirement of the harmonization of liability insurance seems to be emerging so as to ensure adequate compensation for the victims. This has been applied particularly to the field of marine pollution and transportation of hazardous goods. Both the 1989 Convention on Civil Liability for Oil Pollution and the Convention on Civil Liability for Damage Caused during Carriage of Dangerous Goods by Road, Rail and Inland Navigation Vessels apply to such regimes.[8]

As of today, there are no water agreements in the Middle East relating to environmental or resources damage and liability between any of the Parties (except in the case of damage in relation to oil

VI A so-called second generation environmental convention.

pipelines). It may be premature to include such clauses in current water agreements, but due to the general development of environmental liability, they will have to be integrated in future.

Political sensitivities in the region, even on straightforward matters such as water quality standards, are an argument in favour of the development of simple water agreements. However, unless they also include the increasingly generally accepted principles described above, they may backfire down the road. Nevertheless, any sustainable water management regime must be simple in application, thus reflecting political realism.

All the Parties[VII] dealt with in this publication are signatories to the UNCED-declaration and the UNFCCC, and are therefore in general agreement with the underlying principles described earlier. An incremental approach based on these principles may be used as an input to the proposed water agreements. The following three fundamental aspects mentioned above should therefore include:

Economic aspects
- Consider costs and benefits of water production and use (including shadow costs of externalities) for each individual Party.
- Allocate costs and benefits equitably: polluter pays; those gaining compensate losers to help build consensus.

Social equity
- Identify all stakeholders as well as the incidence of costs and benefits of water production and use among them (including externalities).
- Compromise between extremes for allocation of water benefits.
- Grandfathering, based on past usage patterns.
- Equal right to meet basic human needs (e.g on a per capita basis).
- Adjust the costs of supplying water to meet basic water needs and affordability.

Environmental aspects
- Treat water as a scarce environmental resource that is not generally substitutable.
- Minimize both depletion and pollution based on dynamic/long-term considerations.

Water quality in international water agreements

Water quality is a critical part of the environment. Unless water is of a certain quality, it cannot be used for drinking or irrigation. Unless it is treated, or if the purchase of bottled water is not possible, the consequences are potentially catastrophic for the daily life of common people.

This has been increasingly acknowledged. More and more countries are including protection of water quality into agreements with their neighbours. The question is: How much of a tradition

VII Except for Iraq, due to its status in the UN since 1991, but there are strong reasons to believe that they will sign in due course.

is this? This was looked into by Hamner and Wolf (2000), who reviewed 145 treaties from the Transboundary Freshwater Dispute Database and found that most treaties focus on hydropower (39 per cent), with 37 per cent covering water distribution for consumption. Seventy-eight of the 145 treaties studied (54 per cent) have provisions for water monitoring. (It should be noted that CESAR commissioned the Department of Oregon State University to develop this study without their prior knowledge of the Technical Study of the Euphrates and the Tigris Rivers outlined in *Part III*.)

Sixty-three of the 228 agreements reviewed (or 28 per cent) contain references to water quality. Seven were classified as Category One agreements (explicit standards), 40 as Category Two (general objectives), and 16 as Category Three (vague commitments – see more discussion in *Part III*).

The new generation of water agreements and standards, such as the UN Convention on the Law of the Non-Navigational Uses of International Watercourses and the EU Framework Directive on Water, contain protection of water quality. The latter includes very strict water quality standards and monitoring procedures. Today, the Directive goes far beyond any existing water standards set in the Middle East.

In combination with the notion of national sovereignty over water resources, the above principles form the basic approach of this publication. However, a question remains: How may sovereignty be applied when developing solutions?

Water rights and national sovereignty over water resources

Each country that shares an international water resource with another state could claim rights to the resource in one way or another. An obvious consequence of the state's sovereignty is its claiming of the right to own, access, control and use the resource. Since the concept of sovereignty and water rights is frequently used in the public and professional debate, as well as in the legal terminology[9], a translation of these terms into concepts that might be applied in operational negotiations [for a water agreement] seems relevant. Despite the vagueness of the terms, the principles outlined below are derived from the concepts of 'water rights' and 'sovereignty'.

Water rights are interpreted differently in various parts of the world.

A country with water rights has rights to the particular resource concerning the following attributes: ownership; access; control; and/or use. Internationally as well as in the Middle East, there are several examples of water rights attributed to all four 'rights', alone or in various combinations (CESAR, 1996; Solanes, 2000). However, water rights usually entail the right to use, while ownership normally means "a usufructury power, and not ownership of the corpus of water itself" (Solanes, 2000: 265).

In Northern and Central Europe and in the Americas, it is quite common for either a state or an individual owner to own the land, but not necessarily the right to use the water or other derivates from the land-water ownership/access/control/use nexus.[10]

The question is whether experience from other regions in interpreting these water rights are bringing the Parties in the Middle East closer to a solution. What this illustrates is that water rights are interpreted differently in various parts of the world. This fact is perhaps the best argument for tailoring the four concepts into a meaningful and mutually acceptable context of each of the water disputes in the region.

I would argue that the concept of sovereignty, which is closely linked to the concept of rights, might be an appropriate term to translate in a negotiation arrangement. According to international law, sovereignty over any natural resource comprises two important legal principles:

- sovereign rights, i.e. rights of water in respect of either of the attributes mentioned above; and
- sovereign obligations, i.e. obligations to use the water in a certain way, such as sustainable use, environmental protection and economic efficiency (cf. national and international obligations as discussed earlier).[11]

Rights

One may argue that any water solution between Parties should include an interpretation of the four attributes[12] of water rights, such as:

- ownership of which part of the water resource (including recycled water)[VIII];
- access to which part of the water resources (e.g. parts of aquifers). However, this concept is mostly applied in a geographically-defined area, like access to a territory, and is therefore not such a useful concept in this context;
- control of which part of the water resource (including recycled water)[IX]; and
- use of which parts of the aquifers and recycled water.[X]

Obligation

Another meaning of sovereignty is obligation: Each state or state-like entity with rights over specific water resources is obliged to manage them, not only according to national laws,[13] but also according to internationally recognized obligations[14] and even religious law (such as the Sharia[15]). Protecting a semi-renewable or renewable water resource from depletion both in terms of quantity

VIII In this context, this refers to a 'property right entitling the owner of the economic value to the water' (cf. "[H]ence a dispute over water ownership can be translated into a dispute over the right to monetary compensation for the water involved". (Fisher *et al.* 2002: 11-25).

IX In this context, this refers to a 'mandate to protect the aquifer systems' which would also include 'study, monitor, and survey' separately and/or jointly according to a set of water management rules.

X In this context, this refers to a 'mandate to utilize/extract/pump for consumption and/or storage separately and/or jointly'.

and quality is one of the most important obligations of any Party. In this context, these obligations apply specifically to protection against pollution and overpumping (of aquifers).

The political temptation of a one-sided emphasis on water rights is therefore a double-edged sword for any country, since the notion of obligations is equally strong.

Photo 7.
Inside a water quality monitoring station in Syria

This reality is acknowledged by most countries in the region. The questions should therefore be:

1. How can an agreement between the Parties include incremental steps that would incorporate transfer of water rights and obligations in a sustainable and agreeable manner?
2. How can implementation of these steps be enforced in a realistic and structured way?

Quite a few of the water disputes could have been handled differently if the countries had focused on preventive measures rather than on resolution of conflicts after they had escalated.

Anyone who claims that there are quick-fix answers to these questions has limited experience in the region. Therefore, several reservations, particularly political ones, must be made concerning the proposals for resolution of the four water disputes. However, they should not prevent non-partisan observers from offering a proposal. In any case, the Parties will carry the burden of both successes and failures.

'Prevention is better than a cure'

It seems obvious that the most effective way of developing a sustainable water management strategy is to establish appropriate preventive measures, and to make sure that these can be modified if they prove inadequate. Some of the most common measures are listed below.

Monitoring procedures

Experience from inside and outside the region clearly underlines the importance of setting up national water quantity and quality monitoring programmes.

Most countries in the Middle East have, unfortunately, not yet implemented such programmes. This shortfall has hindered water agreements due to the lack of long-term data.

As the various parts of this publication will reveal, it is urgent to establish such programmes, not least for their input to national water management.

Exchange of data, prior notification and fact-finding procedures[XI]

A commonly asked question is: "What are the first steps to take in order to develop a non-committal co-operation with the other Party(ies)?" The answer seems obvious:

One step might be to begin with exchange of technical data and notifications of upstream changes both in terms of water quantity and quality. A next step could be to set up factfinding procedures and missions and, if feasible, develop joint research programmes. These initiatives may provide stepping stones or opportunities for more active approaches (such as diplomatic ones).

...begin with exchange of technical data and notifications of upstream changes both in terms of water quantity and quality...

Some Parties in the region have developed cautious and isolationist ways of thinking by hiding water and water-related data. However, this information will eventually be revealed, and at a time that may not be optimal from a tactical point of view. Those who still favour not sharing such information are overlooking that contemporary remote sensing (for example, even commercial satellite photos) and sensor-technologies give in one way or another the neighbouring country access to a major part of this information.

Monitoring of water resources, exchange of data, prior notification of unilateral actions and factfinding procedures are perhaps the most important and practical diplomatic means for a Party in order to commence non-committal activities.

Legitimacy of proposing solutions to international water disputes in the Middle East

A relevant question would be to ask how a non-partisan participant may propose solutions to the complex water disputes in the region. What are legitimate solutions when politics are overriding most water management concerns?

The external community has a duty to offer solutions. The people living in the countries must take responsibility for what they are willing to accept.

The external community has a duty to offer solutions in line with the principles and yardsticks outlined above. However the people living in the various countries must take responsibility for what they are willing to accept.

There are of course no simple answers. However, they should at least be in line with the countries' accepted *rights* and *obligations* to:

- practice sound environmental management for the benefit of coming generations; and, of equal importance;

XI Derived from Trondalen, 2004a.

- provide its citizens with fundamental human needs such as water for the socio-economic development of their nations.

If those rights and obligations are in one way or another met through a Third Party proposal – irrespective of the ongoing political dramas – this may offer an opportunity for a way out that balances the Parties' various concerns as stated above.

Therefore, the proposals may not fit the political circumstances at the point on the timeline when this book is made public, but rather attempt to offer a possible solution as to how countries' rights and obligations may be met now and in the future.

The proposals should therefore be judged according to this, and not in relation to the constant flux and reflux of politics.

Endnotes

1 In addition, recent dramatic events such as the war and invasion of Iraq in January 1991 and March 2003 are determining both the present political and geopolitical climate, from which none of the solutions should be isolated.

2 See the author's experience as outlined in Trondalen (2004a).

3 Cf. the US Middle East Chief Negotiator, Ambassador Dennis Ross, "We never did anything to prepare public opinion [for peace]. Holding negotiations come what may got us nowhere. If I could do it all over again, I'd do it differently" (Enderlin, 2003: 360).

4 See Permanent Court of Arbitration (PCA) (2003b) as the most authoritative assessment of the law. See also Boisson de Chazournes, 2004.

5 Such as the PCA publication mentioned above.

6 All three principles have been embedded in several major international environmental conventions, such as: (1) The Basel Convention (international transportation of hazardous materials), (2) The Montreal Protocol (protection of the ozone layer), (3) The Forestry Protocol, and more importantly (4) The UN Framework Convention on Climate Change (UNFCCC) - a second-generation convention.

7 See further discussion in Trondalen (2004b).

8 A similar system is being considered in the development of a liability regime under the Basel Convention; the areas under investigation include the establishment of a Special Fund and a system of supplementing intervention by the contracting state (ranked subsidiary to state liability). These elements are considered supplementary to civil liability regimes serving to provide maximum protection and compensation to the victims of environmental damage.

9 The notion of permanent sovereignty over natural resources found its first expression in a UN context already in the 1950s (GA resolution 626, /UN GAOR, Supp. No 20at p.18, UN Doc A/2361, 1952) and is quoted and discussed in Tignino (2003).

10 This view is also supported by du Bois (1995: 111-126).

11 There is a vast international literature on state sovereignty. An example of one such discussion is outlined in Tignino (2003) and her references to the literature, especially on 'new sovereignty'.

12 There might be different ways of classifying these attributes, for example in Islamic Sharia Law, where the following categories are referred to: the 'right to thirst', the 'right of irrigation', 'categories of water', and 'priority of uses' as described in Kristjánsdóttir (2003).

13 For Israel, the Water Laws (5719-1957) amended in 1991, and for the PA the Water Law enacted in March 2002.

14 See for example the European Union's Water Framework Directive, among the most comprehensive and strict legislation in terms of obligations of each member country regarding water protection and sound management (http://europa.eu.int/comm/environment/water/water-framework/index_en.html).

15 Liability for misuse is a strong concept in the Sharia law:
see discussion and further reference in Kristjánsdóttir (2003: 365).

SECTION I

Upper Jordan River and the Golan Heights Basins

Part 1. The water of the Golan Heights –
the final quest for a comprehensive peace between Syria and Israel

Part 2. Boiling point at the Upper Jordan River –
the Wazzani Springs conflict between Lebanon and Israel

Part 1

The water of the Golan Heights -

the final quest for a comprehensive peace between Syria and Israel

Abstract

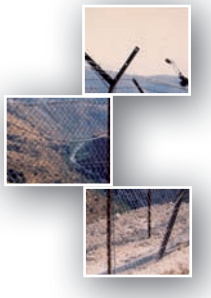
One of the most fundamental conflicts in the region is between Syria and Israel over the Golan Heights. Some would argue that if this conflict is resolved, a more comprehensive Arab-Israeli reconciliation and peace might be achieved.

Part I of this section outlines the relevant historical background for understanding how water resources, especially groundwater, have played and still play a key role in the Syrian-Israeli relationship. Reconciliatory measures such as the Shepherdstown negotiations of January 2000 are described in order to understand the positions and underlying interests of the two Parties.

Based on years of developing an understanding of the Parties' real interests and discussions of possible solutions, a proposal is outlined that should take into account Syria's territorial sovereignty and Israel's need for an uninterrupted flow of water from the Golan. The suggested agreement would allow Syria to resettle the original number of people on the Heights (as of 1967 plus natural growth) and assume full sovereignty of the Golan, including use of natural resources. At the same time, Israel would be able to maintain the current use of water quality and quantity in order to secure the fragile hydrological balance of the Upper Jordan Basin (including Lake Tiberias).

Establishing an internationally supported third party compensation mechanism would provide Syria with the necessary financial and technological know-how to optimize water use in such a way that pollution would be abated and efficiency increased.

Finally, a comprehensive water resource verification and monitoring system is also proposed as a prerequisite for implementing and maintaining compliance of the agreement.



Chapter 1

Water: both a stumbling block and an opportunity for peace

As outlined in the introduction, increasing demographic pressure in the region combined with economic growth and social development is widening the gap between available water supply and demand. This gap is also a concern for Syria and Israel from a humanitarian, security, political and environmental perspective. Water may be substituted, for example as 'virtual water'[1], yet there is still a growing gap between people's expectations of water availability and actual supply.

On the Golan Heights, this gap is compounded by politics. The contested control of water resources between Israel and Syria is one of the most significant and unresolved conflicts in the Middle East. Some would argue that if this conflict is resolved, a more comprehensive Arab-Israeli reconciliation and peace might be achieved.

The Golan Heights were neither part of the United Nations' Partition Plan nor part of the establishment of the State of Israel in 1948. During the war in June 1967 between the two states (in addition to Egypt and Jordan), it was occupied by Israel. Syria insists that any peace between the two countries would include a return of this territory.

Map 2. Overview of the Golan Heights, Syria and Israel

The military significance of the Golan Heights for Israel has been much publicized. What seems increasingly relevant for any solution to the conflict is that a majority of Israeli military leaders argue that due to changes in military technology and strategy, its significance as a foreland has been reduced.[1] Nevertheless, publicly, the significance of the water resources seems to have increased.[2]

1 From an economic point of view, water may be substituted by so-called virtual or invisible water (non-evident water), which is soil water and water embedded in commodities that require water for their production. For example, production of a tonne of grain requires 1,000 tonnes (m^3) of water. A community or economy can balance its water needs by accessing invisible water outside its boundaries (see Allan, 2002).

Both Parties have acknowledged throughout that the dispute over water resources on the Golan Heights, including the headwaters of the Upper Jordan River Basin, is the core of the matter. Unless this is resolved, peace seems improbable.

Before turning to a few relevant historic events and the present situation regarding the nexus of borders and waters, a brief description of the hydro-geographical environment on and around the Golan Heights is outlined.

Brief resource and geographical description of the Golan Heights

Figure 1. An east-west cross-section of the Golan

The Golan Heights are situated upland between Syria and Israel, and borders Lebanon in the north and Jordan in the south.[3] They take their name from the ancient city of Golan, having been known as Gaulanitis, as well as from Arabic, where 'Golan' is derived from the word 'Jaulan' meaning 'land filled with dust'. They consist of a rocky plateau overlooking in the east the plains towards Damascus, west over Lake Tiberias, and south-east to the Yarmuk River and the hills of Jordan.

The lake is known by various names, such as the Sea of Galilee or Lake Kinneret (the latter is commonly used by the Israelis). It will be referred to here as Lake Tiberias.

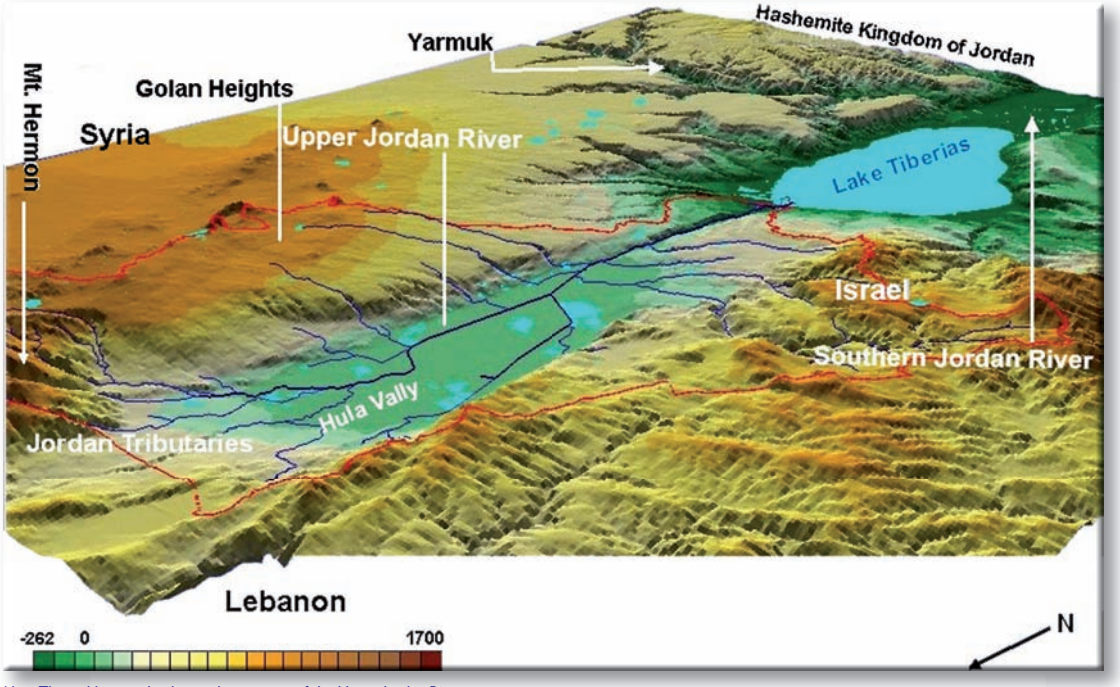
The Golan is made up of two geographically distinct areas: the Hermon Range (mostly limestone) in the north; and the Golan plateau in the south. The former is one of the highest mountain ranges in the entire region. The plateau slopes gently from north to south, descending from 1,200 metres above sea level on its northern edge to 300 metres above sea level at its southern rim. The area to the west of the Golan, however, encompassing the Hula Valley and Lake Tiberias, is 200 metres below sea level, and the dramatic disparity of the landscape creates a diversified scenery along the escarpment that marks the Golan's western border.

The Golan is situated in the Mediterranean climate zone, characterized by dry summers and wet winters. Snow falls for a few days every winter on its high northern end, where Mount Hermon is snow-covered from December to March, with snow patches remaining on the mountain throughout the year. Average annual rainfall ranges between 1,000 mm in the north (in the Hermon area), which is dependant on the winter rain, to about 450 mm of rain annually in the southern part of the Golan, with dry summers and large evaporation. The rainfall is the main determining factor for the surface and groundwater that is so crucial for the people on the Golan as well as for replenishment of the lake.

Surface water

Almost all of Golan lies within the Lake Tiberias catchment area. In addition to three of the Jordan River's main sources, the Hasbani River (originating from Lebanon) and Dan and Baniyas rivers that rise on the slopes of Mount Hermon,

Map 3. The Golan Heights and Upper Jordan River



Note: The red line marks the catchment area of the Upper Jordan River.
Source: Data based on Hall, 1996.

Golan Heights – brief facts

Area	1,158 km²	Jewish population	16.500
Highest peak	2,224 m above sea level	Syrian population	17.000
Villages	36 (4 Syrian (druze) and 32 Jewish)	Main town	Katzin (the only town)
Nature reserve	246 km²	Cultivated area	80 km²
Grazing lands	460 km²		

several seasonal streams rise on the Heights and flow into the lake, either directly or *via* the Jordan River (Gvirtzman, 2002).

The drainage-divide-line of the Golan more or less coincides with the UN Armistice line (see *Map 3*). A significant part of the Lake Tiberias area drains from the Golan (350 km² drain into the Jordan River and 600 km² directly into Lake Tiberias). The remaining 200 km² drain into the Rokad and Yarmuk River basins. This means that almost all of the water drains down ravines and canyons to waterfalls that hurl the melted snows of winter into a series of deep secluded pools towards the Lake Tiberias and Yarmuk River.

In addition, the Upper Jordan River Basin drains the water to Lake Tiberias and consists of three rivers:

- Hasbani ('Snir') River, with an average flow of 135 MCM per year. Most of its catchment area is located in Lebanon, including the

recently-contested Wazzani Springs (see Omberg Hansen, 2004) (see also *Part 2*);

- Dan Springs, with an average of 250 MCM per year. Its aquifer is replenished mainly by snow from Mount Hermon; and
- Baniyas (Hermon) Springs, with around 120 MCM per year. Surface water and snow from Mount Hermon also replenish its aquifer. Originally assigned to the British Mandate by the 1920 Anglo-French Convention, the Springs were located 1 km inside Syria when the border was brought into legal force by 1923 (see Hoff, 2000 and Amery and Wolf, 2000: 151). The springs and a short stretch of the river came under Israeli control in June 1967.

Groundwater on the Golan Heights

The groundwater of Golan is a complex structure that primarily drains toward the lake. The Israelis have viewed the underground resources as vital to the hydrological balance of the lake, and have conducted in-depth analyses of the aquifers on the Golan in terms of both its natural and sustainable yields (pumping on a yearly basis) and its quality and pollution levels. It is beyond the scope of this publication to outline this science, except to point to the vast literature in this field.

The groundwater quality of the Golan Heights Aquifers is considered excellent, even though several cases of contamination (mainly by dairy farm manure) have been reported. The local (Basalt) aquifers in the Golan are sensitive to surface contamination, since it is mainly a phreatic aquifer.

There are about 100 springs of varying yields on the Golan, much of the water from which is used to service Israeli settlements (according to Shuval, 1994).

Although there seems to be a scientific consensus that the water quality is satisfactory, a more comprehensive automated water quality monitoring system is, from an Israeli perspective, desirable. This is regardless of the outcome of peace talks between the two countries.

Water reservoirs

After 1967, the Israelis developed the water reservoir system on the Golan to include 17 reservoirs. They are currently the basis of the irrigation water supply system. The total volume of the reservoirs is over 36M m^3.[4] In case no peace agreement has been reached, according to future Israeli plans there is an increase of 1.5M m^3 of water consumption for agriculture every year. Investments are planned mainly for wastewater treatment facilities, water reclamation systems for agriculture and improvement of water systems for domestic use. These measures and the construction of reservoirs are made primarily to catch the winter flood (for summer irrigation) and to avoid wastewater from reaching the lake or Yarmuk River.

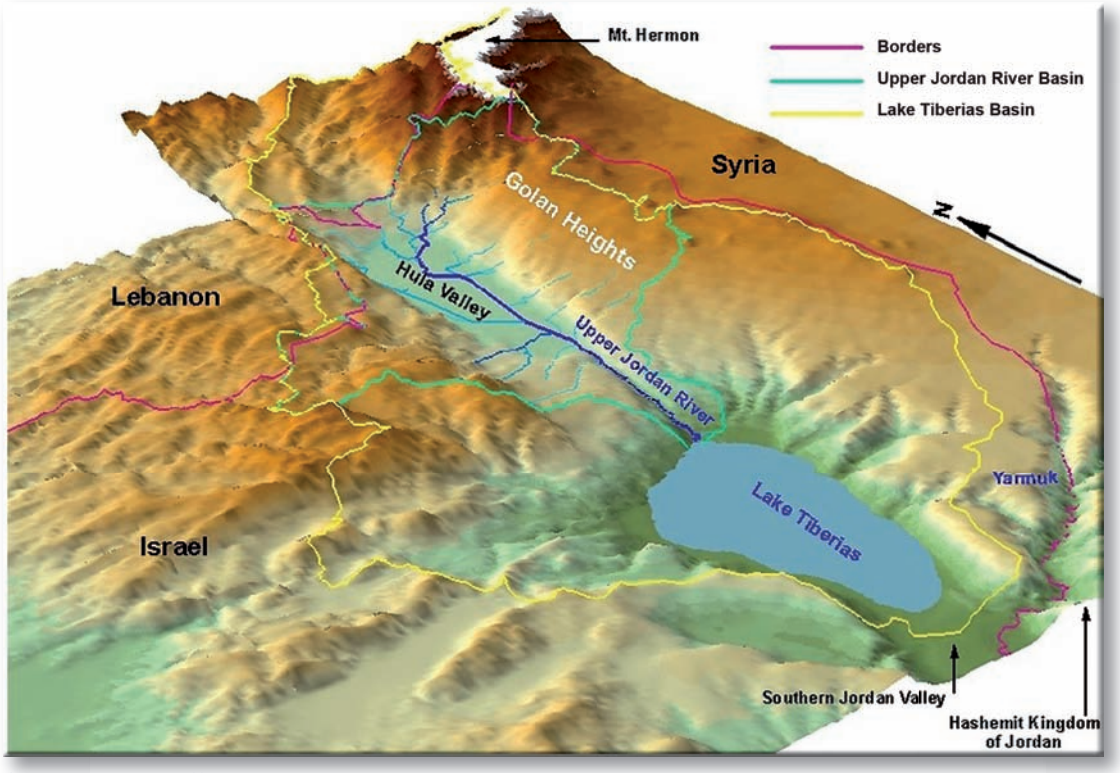
Wastewater treatment on the Golan Heights

There is limited public information on treatment of water from the Israeli settlements, except that there is consensus among water professionals that wastewater is taken care of in a controllable manner.

The four Syrian/Druze Villages[II] – Masade, Bukata, Magdal Shams and Ein-Kunya – in North Golan Heights include approximately 17,000 Syrian/Druze inhabitants. Sewage in these villages is collected either into the main sewage system or into an absorption pit. However, the main sewage

II Syrians name them 'Syrian Villages', while the Israeli call them 'Druze Villages'.

Map 4. The basin of the Upper Jordan River and the Golan Heights



Source: Data based on Hall, 1996.

Table 1. Comparison of share of discharge and allocation before 1967 and after, as well as Johnston Plan and early 1990, respectively

Discharge and allocation shares in the upper Jordan River Basin (including the Golan Heights) in MCM (per cent of total)[a]

Country	Share of discharge		Share of allocation[b]	
	Before 1967	After 1967	Johnston Plan	Early 1990s
Syria	560 (42%)	375 (27%)	130 (10%)	150 (13%)
U. Jordan R.	155	-	40	-
Yarmuk R.	375	375	90	150
Israel	335 (25%)	570 (42%)	400[c] (31%)	700 (61%)
U. Jordan R.	250	405	375	675
Yarmuk R.	-	-	25	25
Lebanon	95 (6%)	95 (6%)	35 (3%)	5 (0,5%)

a) Soffer (1994) and Klein (1998)
b) Allocation and use do not sum up total discharge as some water reaches the Dead Sea.
c) Israel to receive excess water

Source: Revised after Feitelson, 2002.

system does not end in a proper wastewater treatment plant. Rather, it flows into the Sa'ar Stream and later to the Baniyas, one of the largest sources of the Jordan River. Wastewater from the east part of these villages seeps into groundwater and flows east into the Rokad River. An effluent treatment reclamation programme for the Syrian/Druze villages is planned. This will have an impact on environmental and groundwater protection from sewage pollution, and on the prevention of pollution of the Jordan River.[5]

Even today, there seems to be a need to further protect water resources from pollution.

Division of water resources among the countries

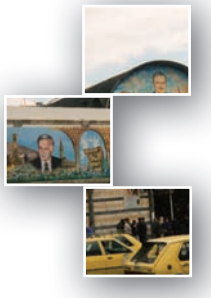
The combination of the complex hydrological structures of the Golan, including the Upper Jordan River, and the strained relationships between the countries has to date made a water agreement impossible. The only bilateral agreements are between Jordan and Syria through a Memorandum of Understanding on the Yarmuk River (which includes building a so-called 'Unity Dam') and between Jordan and Israel from 1994 encompassing, among other clauses, water allocation regarding flow from Lake Tiberias (see peace treaty between Israel and Jordan in Haddadin, 2001).

The relevant question is therefore: Could any yardsticks or points of reference be used in order to determine a water allocation scheme? The only proposed allocation formula was made by US Envoy Ambassador Johnston back in 1956[6]. The so-called Johnston Plan outlined a formula that reflected the 'facts on the ground' at that time, which were however somewhat different from today's situation (see further discussion in Chapter 3).

Some conclusions could be drawn from the overview, but only a few of these offer direct solutions to the present dispute. Although the Johnston Plan was never accepted by either Israel or the Arab States, it provides a point of reference for discussions on what water might eventually be allocated.

What Ambassador Johnston did not foresee was that the water quality would be contested as much as the quantity. The next chapter will assess how the water disputes were handled at the time and later, leading on to the following chapter that outlines solutions.

Photo 8.
The Yarmuk River in the background between the Golan Heights and Jordan



Chapter 2

Water resources on the Golan Heights: the conflict

The evolution of the Syrian-Israeli relationship

Historically, the two countries have been intertwined for centuries. They share many common traits such as religion, culture, people, customs and language. Trade and business over the years have mirrored the geographical features in major cites like Aleppo, Hama and Damascus, which have been linked to the east-west trade of the Silk Road as well as to the north-south movements along the Euphrates waterway. The proximity to the coast of what is now Israel have made it part of what the French call the Levant (today's Lebanon and Syria), an integral part of the cultural, economic and geographical landscape of the Middle East. Ancient and Biblical ties bind the people together in a remarkable way, and water resources have always played an important religious, cultural, agricultural and political role.

The fall of the Ottoman Empire at the beginning of the 1920s resulted in the establishment of the present states of Syria and Lebanon as well as the Zionist movement that increasingly evolved up to the 1940s. Syria and the then British-mandated Palestine did not have a tense relationship before the establishment of the State of Israel in 1948.[7] Several armed skirmishes took place, especially in the 1950s, related to the demilitarized zone, and leading to wars in 1967 and 1973.

Many view the Syrian-Israeli relationship as an indicator of the regional desire and ability to move into stability and, eventually, peace talks.

After 1973, little progress was achieved in improving relationships until the mid-1990s (see Ross, 2004: Chapter 5). Several initiatives were taken from May 1994 up until late 1999 that led to direct peace talks commencing in January 2000 under the auspices of the United States.

In May 1999, as the late Israeli Prime Minister Yitzchak Rabin had done, Prime Minister Ehud Barak set out a course to make a deal with the Syrians. Syria reciprocated Israel's call for talks by reiterating its longstanding position of a 'land-for-peace' formula. Together with Barak, the late Syrian President Hafez al-Assad made bold moves at the end of 1999, prompting the United States to undertake several secret consultations between Syria and Israel that culminated in the start of negotiations in the US on 3 January 2000. Prime Minister Barak and the Syrian Foreign Minister Farouk al-Shara headed each delegation.

According to the detailed accounts of the negotiations by US Chief Envoy to the Middle East, Ambassador Dennis Ross (Ross, 2004) and the book by former Secretary of State Madeleine Albright, *Madame Secretary* (Albright, 2004), a set of events made such a process feasible, including the increasingly unpopular occupation of South Lebanon and the loss of Israeli soldiers there. Barak promised the Israeli electorate to pull out the forces from South Lebanon within a year (after he resumed power). Likewise, he looked at himself differently from his predecessor, Benjamin Netanyahu, in the sense that he believed that he could make a peace deal with Syria. He was of the firm opinion that despite the hostile relationship between the two countries, the late President Hafez al-Assad would be able to stand by his commitments for a peaceful relationship, and subsequently get the Shiite Movement in Lebanon and those fighting for it under control.

Syria publicly reiterated their land-for-peace formula embedded in a statement that it would be 'without predetermined conditions'. However, it was obvious that President al-Assad would maintain the longstanding position: "No Syrian land to be handed over".[8]

There are strong reasons to believe that Syria was seriously preparing its population for a settlement with Israel, not only from detailed accounts from those involved in the talks, but also from how the public was being prepared for a peace. For example, posters and banners were being replaced in the major cities in Syria. One of the most striking signs was the replacement of the banner of the Commander-in-Chief President al-Assad with that of the peace-making Statesman President al-Assad (see photo on next page) outside the famous Souk El-Hammidya of Old Damascus (near the Umayyad Mosque).

Likewise, the Israeli public was, according to the polls, becoming increasingly optimistic about a possible peace with Syria. This was despite the fact that the opposing settlers on the Golan had joined forces with likeminded opposition in the West Bank and Gaza – and even in parts of the American-Jewish community in the United States (see *Rabinovich, 2004*).

US-led Shepherdstown negotiations

The US-led Shepherdstown negotiations[9] dealt with the two major challenges, "borders and water"[10], including three other more-or-less interconnected areas, together creating five 'groups':

- borders (demarcation/delineation of the exact border – although the 'border committee' never met);
- water (rights and control over water resources, particularly rights to Lake Tiberias, the Upper Jordan River and the Golan Heights, related particularly to use of and pollution from water resources on the Golan Heights);
- security and disarmament;
- normalization (such as diplomatic recognition, trade and tourism); and finally
- the 'Lebanese Track'.

The Parties had different views on whether these issues should be negotiated together, which was the Israeli position, or whether some of the matters, such as normalization and the 'Lebanese Track', could be postponed to a later stage. The Syrians argued in favour of this latter position.

Quite early, however, it became clear that the interconnection of water management and the exact location of the boundaries along the north-eastern part of Lake Tiberias and the Upper Jordan River would determine whether or not there would be peace.

Photo 9.
Souk El-Hammadya of Old Damascus in December 1999

The stakes were – and still are – high on both sides:

- Since 1967, Syria has been steadfastly concerned with its territorial sovereignty. The political significance domestically, as well as in the Arab world, of getting the Golan back should never be underestimated.[11]
- From a strategic, economic, water management and even humanitarian point of view, Israel was firm that the vital water resources had to be protected and the flow uninterrupted, as the lake makes up about 35 per cent of all its freshwater resources (see Gvirtzman, 2001).

The few publicly-available substantive reports from the Shepherdstown negotiations can be found in former US President Bill Clinton's memoir, former Secretary of State Albright's memoir, French Middle East Journalist Charles Enderlin's insightful publication and, not least, the detailed and narrative book by former US Chief Middle East Envoy Dennis Ross. The respective publications vividly describe how negotiations reached a point where the water/border nexus remained the main obstacle to further progress.

The water/border nexus

The conflicting interests of the two Parties regarding 'safeguarding the water' for the Israelis and the territorial sovereignty for the Syrians were linked to two matters perceived as irreconcilable:

- How could the surface and underground water resources from the Golan Heights and Upper Jordan River be secured in terms of quantity and quality when Syria demanded a boundary that might infringe on control of the water resources?
- In addition, how could the water be protected when Syria demanded resettlement on the Golan by a population amounting today to almost half a million?

With hindsight, an interesting question is whether a peace agreement would have been possible if the dispute over the 'water/border nexus' had been resolved in 2000.

The talks in Shepherdstown ended without a solution, although a 'working text' from the US – which *de facto* reflected more or less the Parties' positions at that time – was leaked to the press.[12]

The US continued to work behind the scenes in the coming months, with the efforts ending in a final meeting between President Clinton and President al-Assad in March 2000 in Geneva.[13] The meeting bore no fruit and created perhaps an even more unsettled climate than before. During it, Clinton presented a map to al-Assad on how Israel anticipated the borders at the strategic land strip around the lake. The proposal was perceived by al-Assad at that time to be unacceptable (Clinton, 2004: 903) because it did not reflect their interest regarding the border and territorial sovereignty (which included the demand for resettlement of Syrian 'refugees' on the Golan).[14]

Is water always going to be the stumbling block for peace between the two countries?

Several reasons may explain why the Geneva meeting did not yield an agreement.[15] However, there are strong reasons to argue that the solutions presented back in 2000 were not fully developed, and it is further known that these matters were discussed again after the Geneva meeting. However, time was running out. On 10 June of the same year, the Syrian President al-Assad died, President Clinton stepped down in January 2001, and subsequently the Israeli Prime Minister Barak lost the election to Ariel Sharon.

With hindsight, an interesting question is whether a peace agreement would have been possible if the dispute over the 'water/border nexus' had been resolved in 2000.

The short answer is, probably, yes. There were, however, several unresolved issues, such as the public mood in Israel, the issue of the succession of Al-Assad and the overall political situation in the Middle East. This was primarily the relationship between Israel and the Palestinians as well as factors such as the relationship between Syria and the United States[16], between Syria and Lebanon, and the 'Iraqi situation' that together determined the outcome.

The nexus of water and borders along the Upper Jordan River and Lake Tiberias is complex in political terms. One assumption is that none of the countries, or the US as a Third Party, had developed timely solutions to the problems. This may be one of the reasons for which the water/border dispute derailed a peace agreement.[17] Due to the role of the US in the Syria-Israel talks, very few other actors contributed to the talks.

The author argues that the two principal and as yet unresolved water-related problems[III] are solvable.

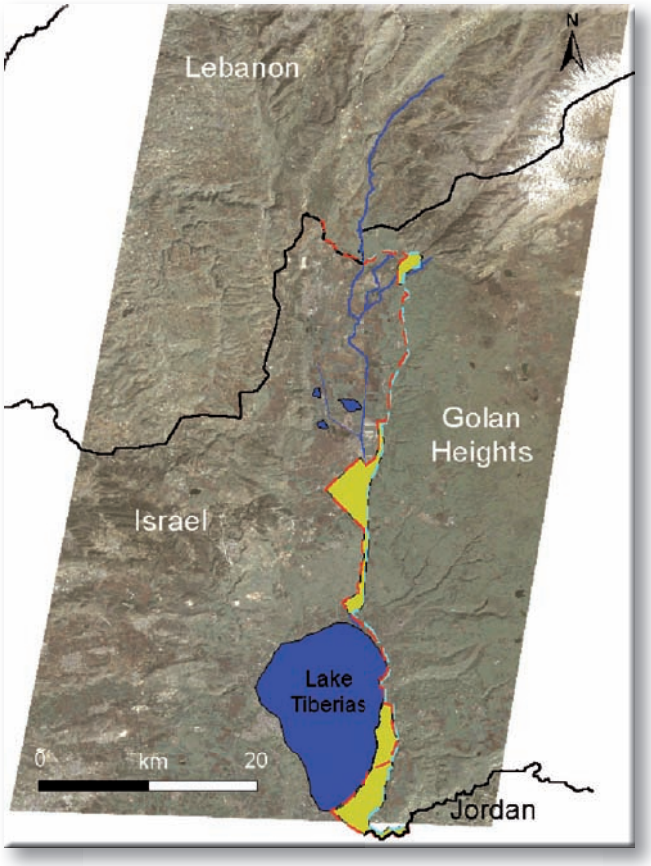
Recognition of borders

Already in the aftermath of World War I, controls of vital water resources were high on the political agenda. When Britain and France entered into detailed negotiations to draw the frontiers, water was at the forefront of their concerns. According to renowned scholar David Fromkin, Palestine and Syria-Lebanon were still vague terms, and it was unclear where one ended and the other started:

> "For the French pictured the frontier as between France and Britain in the Levant, and took an uncompromising position ... At stake in the negotiations of Palestine's frontiers were the valuable headwaters of the Jordan and Yarmuk rivers – which the French successfully insisted on obtaining for Syria-Lebanon." (Fromkin, 2001: 441)

III (a) Control and access to the water flow to Lake Tiberias, as well as (b) use and protection of the water resources under resettlement of Syrians to the Heights.

Map 5. Present and historic borders between Israel, Syria and Lebanon (the black line represents the so-called 'blue line' set by the UN between Lebanon and Israel/Golan Heights)



The **Turquoise** *Line marks the old border between Syria and at that time called Palestine. In March 1923, the Anglo-French Boundary Commission completed the work on th Border Posts – thus this is know as the 1923 International Boundary.*

The **Red Line** *represents the July 20th 1949 Armistice Line between Syria and Israel. Following the War in 1948, UNTSO determined the boundary where it differed from the 1923 International Boundary, and Syria agreed to withdraw from the land west of the 1923 Boundary (i.e., on the Israeli side, becoming the Demilitarized Zones (DMZs).*

The **Yellow Area** *represents the DMZs. The Armistice Agreement did not decide on the sovereignty rights in the DMZs.*

Sources: Data from Lebanon derived from Landsat ETM and ESRI from other areas. Data processed by MAPS Geosystems s.a.r.l., Beirut, Lebanon. The 'International border' is based on data from UN Map 'Levant 50J19 Houle' and the current Lebanese/Israeli border is based on the UN 'Blue Line'.

When Great Britain finally accepted the French Trusteeship of the Levant (presently Syria and Lebanon), voices advocated that the crucial water sources should be within – at that time the anticipated – Palestine. The so-called *Balfour Declaration* was embodied in the League of Nations[IV] entrusting Palestine to Britain, and the Zionist leader Chaim Weizmann wrote to British Prime Minister Winston Churchill in early 1921 that the agreement with France "cut Palestine off from access to the Litani, deprived her possession of the Upper Jordan and Yarmuk and took her fertile plains east of Lake Tiberias which had hereto been regarded as one of the most promising outlets for Jewish settlement on a large scale" (Fromkin, 2001). Justice Brandeis, the leader of American Zionism, sent a similar cabled message to Balfour towards the end of 1921, deploring the loss of water at the Litani River (in what is now Lebanon) (Fromkin, 2001: 513).

Several border proposals were discussed between Britain and France in the early 1920s. Some of the various borders are outlined below, including the

IV The forerunner of the United Nations.

Sykes-Picot borders, which were not only limited to the 'Palestine-Syria-Lebanon' borders.[v]

The basis for the current so-called pre-1967 border between Syria and Israel is the March 1923 border, known as the 'international border'. The difference between that border and the border of 4 June 1967 is that the latter contains two sets of boundaries. The first dates back to March 1923, while the second is the Armistice Line from 1949, including four demilitarized zones (from the northern Baniyas areas to the south at El Hamma at the Yarmuk River; see *Map 5*).[18]

The exact geographical locations of the borders are significant as regards management of water:

1. The border in the northern part of the border area makes Syria a riparian part of the Upper Jordan Basin, i.e. the perennial sources of Baniyas are located some 200 metres into undisputed Syrian territory.
2. The March 1923 border is on the riverbank of and not in the Jordan River all the way down to Lake Tiberias. This is interpreted by Israel in such a way that Syria has no riparian rights to the river itself. However, Syria has argued all along that that this is not so important, since it is already a riparian (due to the Baniyas sources).
3. The March 1923 border along the lakeside until almost the middle of the lake is 10 metres from – at that time – the shoreline (i.e. lake/land intersection). According to international law, a country is not riparian if the border is 10 metres or more away. However, the Syrians had access to the lakeshore until June 1967 due to the Anglo-French Convention of 1923, which enacted a "good neighbourly relation" in 1926.
4. The border at the El Hamma (Hamat Gader) that forms the enclave at the Yarmuk River is disputed, since it is on the Israeli side according to the March 1923 border, but later came into the hands of Syria. If El Hamma belongs to Israel, it will become a riparian Party to the Yarmuk River.

In addition, the recent dispute between Lebanon and Israel over the Wazzani Springs of the Hasbani River has further complicated the matter. The border issue has therefore not been divulged and there is no mutual recognition of water rights.

In *Chapter 3*, the border/water/resettlement of Syrians to the Golan nexus is assessed in relation to the Parties' positions and concerns, with the aim of proposing a solution (see *Chapter 4*).

v Mark Sykes and Francois Georges Picot were respectively the British and French negotiators on national borders beginning in 1915.

Chapter 3

What are the Parties' positions and real concerns?

Over the years, the Parties have made public statements that appear to be mutually irreconcilable regarding the as yet unresolved water/border nexus and water-related problems on the Golan Heights. However, up to the late 1990s, neither of them authoritatively set forth their respective position, much less their minimal requirements (see also Hoff, 2000 and Amery and Wolf, 2000). From 1999 onwards, the positions became more explicit. Below, they are described primarily based on an assessment of:

- public oral and written statements by the leaders of Syria and Israel;
- the 'official working text' as reflected by the US from the Shepherdstown negotiations[VI];
- the accounts of the negotiation at Shepherdstown as outlined by former US President Clinton, former US Secretary of State Albright and Chief Negotiator Ross in their respective memoirs;
- documentation from the French journalist Enderlin (2003) and the American writer Swisher (2004); and
- the author's familiarity with both Parties' positions and concerns.

The Parties' positions on the water disputes over the Golan Heights may be outlined in relation to:

- the exact location of the borders[VII];
- control over, access to, and protection of the water resources, and
- the return of Syrian citizens to the Golan Heights.

From an academic and historic perspective, discussion is merited on the meaning of the notion of territorial sovereignty as regards almost every metre along the borders of Golan (except on the eastern border, i.e. the area of the UN Disengagement Observer Force). The purpose of this publication is, however, to assess relevant information in relation to a proposed solution. The following outline therefore focuses on what has been achieved to date in order to bring the discussion forward towards a possible conciliation of the different positions.

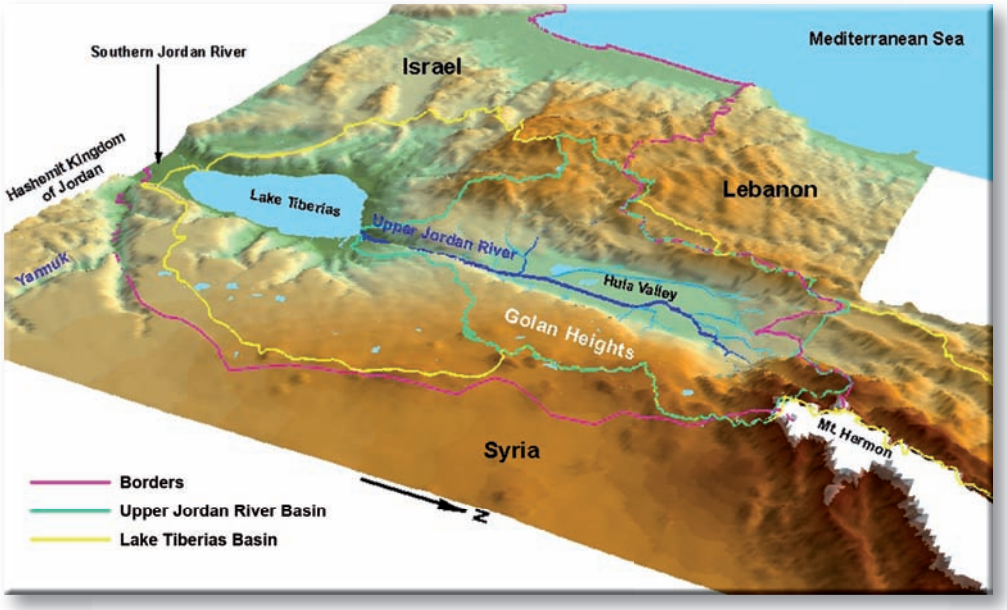
The overarching principle in any conflict resolution[VIII] is that the solutions must address the important concerns of both Parties. In an academic sense, it should be possible to sharply

VI Made publicly available on the Internet for some days after the Shepherdstown negotiations in Israel.

VII Syria and Israel preferred the terms 'delineation' and 'demarcation', respectively.

VIII See Trondalen, 2004a

Map 6. The Golan Heights seen from a Syrian perspective (westward)



define their positions. In reality, however, neither of the positions is carved in stone. Sometimes the total sum of the factors is different from the sum of isolated factors. In political terms, this means that one of the countries may be willing to yield on one position assuming there are some concessions on other positions, or that the overall outcome justifies the compromises. The order in which subjects should be negotiated was also significant for Al-Assad and Barak, on different matters.

Syrian positions and concerns

Syrian perception of the borders

Syria claims the return of all occupied land in compliance with UN Security Council Resolution 242 according to the 4 June 1967 line. The belief that "all the land must be returned in exchange for peace" should not be underestimated in terms of pride, policy and being treated equally with Jordanians and Egyptians (in their peace deals with Israel).[19] This is clearly understood as "full territorial sovereignty over its land up to the external borders" – including the borders to Israel and Lebanon. Syria has indicated a willingness to allow international control, monitoring and verification of provisions associated with its border with Israel. In practical terms, this means that the country would probably not only allow, but even welcome some sort of international presence – like the existing United Nations DOF – along the border. This issue was handled by the security/disarmament nexus of the Shepherdstown negotiations.

In this context, the border at the lakeside has become the crux of the matter. Syria has publicly stated that since Israel insisted that it had to secure the water rights and free flow of water resources draining down from the Jordan River and the Golan Heights, "in case the border should be drawn East of Jordan River and of the Eastern Shore of Lake Kinneret, it would be a gift and not an acquired right" (Clinton, 2004).

It is further understood from the Shepherdstown negotiations that Syria eventually agreed that "50 metres' 'access land' away from the shore line" should be given on the condition that Israel would accept the 4 June 1967 line (Clinton, 2004: 887). This position also coincided with the old Syrian position that the border would constitute the shoreline (i.e. the land-water intersection) at the time in 1967.[IX] Since then, the lake has shrunk by approximately 4.5 metres down to the present level of 213 metres below sea level. Consequently, the shoreline has geographically moved 120-300 metres west[20] of the 1923 line. Moreover, in the draft text leaked to the *Al-Hayat* newspaper on 9 January 2000, Syria recognizes that: "the line of June 4th is not a border and has not been marked out, and it therefore agrees to participate in the determination of this line" (Enderlin, 2003: 134).

Syrian President Bashar Al-Assad's made an explicit statement about water as an integral part of a comprehensive agreement.

In terms of principles, Syria's insistence on the 4 June 1967 line could contribute to paving the way towards reconcilable positions, i.e. that both countries be able to claim their historic rights. As in any negotiation, however, this position was given at a point in time when other factors were being taken into account. Afterwards, the late President Al-Assad made a statement that may be interpreted as a slight backing-down from this position.[21] However, Al-Assad's statement must be understood in the light of the timepoint when he received the 'very disappointing offer' from Prime Minister Barak as communicated by President Clinton during the Geneva Meeting (on 27 March 2000).

Control, access and protection of the water resources

Syria's concern throughout has been territorial sovereignty, and their positions on the water resources were derived from that notion. The country therefore claims that a resolution of water issues should be: "based on relevant international principles and practices" and "mutually agreeable arrangements with respect to water quantities and quality from the surface and underground waters in the areas from which Israeli forces will withdraw."[22]

In what might be considered to be Syrian President Bashar Al-Assad's first interview after he succeeded his father in July 2001, he made an explicit statement about water as an integral part of a comprehensive agreement.[23] However, Syria has made it clear that they will not claim water rights for the lake or on the Heights *per se*, and explains this by claiming that it would have developed the resources before 1967 if it had had such ambitions.[24]

Syria's position on water on the Golan must be seen in the wider context

It seems obvious that Syria's concerns for water resources on the Golan must be seen in a wider context. Hydro-politically, the country is in an extraordinary position: it is both an upstream and a downstream country on the Euphrates and Tigris Rivers (see *Section III*), meaning that Syria ought to balance carefully the hydro-political doctrines that favour down and upstream countries.[25] All along, Syria has therefore been meticulous in not linking the Jordan River Basin with the Euphrates and Tigris Basins.[26] This is

IX Both countries have developed certain interpretations of the rights to the various borders. However, for the purpose of this publication, this discussion is not taken further.

further underlined by the fact that Syria is upstream of Jordan on the Yarmuk River, and would like to avoid a comparison between their upstream behaviour and that of Turkey.

For various reasons, there is almost consensus among Syria, Turkey, Iraq, Jordan, Lebanon, the Palestinians and Israel not to link the hydro-politics of the basins. This is despite the fact that the proposed water-transportation-by-ships agreement signed in 2002 between Turkey and Israel was portrayed in Syrian media as linking them (i.e. "transferring water away from the Euphrates Basin to the port of Manavgat in Turkey", which in strict hydrological terms is however incorrect).

Recently, the cautious and carefully worded response from Syria on the water dispute over the Wazzani Springs at the sources of the Hasbani River between Lebanon and Israel illustrates Syria's sensitivity as regards linking water disputes whenever the Golan or the Euphrates are in question.[27]

Syrian demand for development of the Golan Heights, including returnees of Syrian citizens to the Golan Heights

Syria has for some time argued that *territorial sovereignty means the right to develop the area, including re-establishing a population on the Golan* equivalent to the Syrian population living there in 1967 plus natural population growth, calculated at 3.8 per cent per annum.[28] This may be equivalent to a population of around 450,000 people in the year 2004.[29]

Prior to 1967, Syria had ambitions to develop the water resources as in 1965-1966, following a decision by the Arab League. It began to implement a large-scale project for diversion of the Jordan headwaters directly into the Yarmuk River (see Naff, 1994 and Feitelson, 2000). Such actions must be viewed in light of the Syrian perception of territorial sovereignty at that time.

Although re-establishment of the Syrian population was not an explicit mainstream theme in the Shepherdstown negotiations, it was an important matter throughout as it was a natural consequence of the country's longstanding interpretation of territorial sovereignty. One of the most forceful statements was made by Syrian Foreign Minister al-Shara in a written speech to President Clinton and the Israelis on 15 December in Washington DC:

> "...[the media] tried to arouse the sympathy of the international community on behalf of several thousand Golan settlers, arrogantly ignoring over half a million Syrians living in dozens of villages on the Golan, [which] today, have been totally destroyed, though these [are] villages where their ancestors had lived for thousands of years ..." (Enderlin, 2003: 131).

Israeli positions and concerns

Israeli perception of the borders

Israel's claims are legitimized by the March 1923 borders and interpreted in such a way that the borders should be drawn in order to secure primarily Lake Tiberias as well as the flow and quality of the Baniyas, Dan and Hasbani Rivers.

The borders in the north at the headwater of the Upper Jordan River Basin and along the lake are of utmost importance for Israel. *Map 5* (as well as *7* and *8* in *Part 2* of this section) outlines the March 1923 and so-called 4 June 1967 borders. The Parties formally dispute their rights to the demilitarized zones. However, the border delineation/demarcation seems indeed solvable.

It is the interpretation of what the borders mean in relation to control, use and ownership of the water that is contested.

Israel has always advocated for an absolute minimum distance of the border from the lake of 10 metres and stated that this was agreed on. This is due to a rule in international law that land adjacent to a river at a distance of 10 metres gives a nation the right to the water.[30]

Four sections of the boundary are of special significance (see *Map 5*):

5. the demilitarized zone at the northern border at the Baniyas River – the March 1923 border is desirable from an Israeli perspective;
6. along the Jordan River and south to the point where the river reaches Lake Tiberias. There are reasons to believe that Israel will accept that the border is at the riverbank as described in the March 1923 agreement. The DMZs will probably under no circumstances be handed over. Israel might, however, insist that no additional riparian rights be granted (except for the Baniyas area) as a consequence of that line;
7. the border at the lakeside up to the middle (at Kursi) where the old border is located 10 metres from the former shoreline will remain and preferably be expanded due to lower water levels of the lake. The same principle might be applied in relation to the Armistice line from 1949 and the disputed demilitarized zones. A trade-off between this area and El-Hamma might be feasible (see *Part II* of this section for further discussion on this);
8. finally, the El-Hamma Spring situated at the Yarmuk River (the latter being shared between Syria, Jordan and Israel). The sources of this river are mainly located in Syria. It forms the pre-1967 border between Syria and Jordan down to the tripartite border at the El-Hamma, south-east of Lake Tiberias, then the Jordanian-Israeli border towards the point of confluence (Naharayim) with the Jordan River (see *Map 5*). There has never been a separate agreement on the Yarmuk River between Syria and Israel. Instead, Syria and Jordan signed a separate agreement in 1953 and 1987 on building a dam, the so-called 'Unity Dam' including use of the stored water in the dam. The Peace Treaty between Jordan and Israel contains specific provisions on water allocation between them (Alster, 1996). There are strong reasons to believe that Israel will not demand riparian rights to Yarmuk if no rights are granted to Syria on Lake Tiberias.[31]

Israel's position is that a resolution shall ensure "the continuation of Israel's current use in quantity and quality of all the surface water and underground waters in the areas from which Israeli forces relocate."

Control, access to and protection of the water resources

Israel's principal position is that a resolution on water issues shall ensure "the continuation of Israel's current use in quantity and quality of all the surface water and underground waters in the areas from which Israeli forces relocate".[32] Israel claimed arrangements to include "all necessary measures to prevent contamination, pollution or depletion of the Kinneret/Tiberias and Upper Jordan River and their sources" (hereafter called the 'Israeli current use claim').

It is acknowledged that the Israeli position to date has been full riparian rights to Lake Tiberias and unrestricted natural flow of the Dan, Hasbani and Baniyas rivers as well as the springs that naturally drain to the lake (see Alster, 1996). The water draining to the lake should be of a quality

Photo 10.
The Baniyas River before it reaches the Jordan River

no less than the existing water quality, or should not be allowed to vary outside agreed limits.

Since the Shepherdstown negotiations, the Wazzani Springs Dispute between Lebanon and Israel has escalated and in some ways complicated matters. This is because it is impossible – in hydrological terms – to de-link the latter dispute from the question of water rights related to the Golan Heights. The two disputes are discussed separately from a technical and hydro-political point of view. However the dispute resolution processes ought to be seen in relation to each other (see *Part 2*).

It appears that Israel's positions as stated above are not the absolute bottom line, since the Israelis are implicitly accepting Lebanon's demands of water from the Wazzani.[33] The country's stark objection to unilateral action from Lebanon is more related to how it is carried out rather than to whether they use a certain amount or not (see further discussion in *Part 2*).

The Israeli position on the Syrian demand for the return of citizens to the Golan Heights

The Syrian position on returning its citizens to the Golan Heights has been a realistic and disturbing concern for Israel.[34] However, some have argued that as long as Syria agrees to ensure continuation of Israel's current use in quantity and quality, it is not up to Israel to decide how this is carried out.

Nonetheless, the reality in the Middle East is not as simple. It is anticipated that the proposed military/security monitoring arrangements (that were more or less agreed on in Shepherdstown) might be expanded to include the water resources. Israel is extremely concerned with the practical implementation and enforcement of any water agreements, and the Israeli behaviour in Shepherdstown might be better understood when this is taken into account.

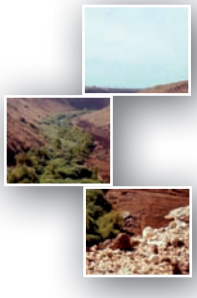
Just before the departure of the Israeli delegation from Israel to Shepherdstown, the Israeli Water Commissioner appeared before the Knesset's Committee for State Control and underscored this concern.[35]

> "If the Syrians settle the Golan with hundreds of thousands of inhabitants who do not handle sewage and pollution in proper fashion, this will spell certain doom for the Kinneret – without any doubt."

The Israeli Mekorot (the National Water Corporation) makes it clear in its report that unless Israel arrives at some "reasonable arrangements with Syria", it must "refrain from evacuating the Golan" – in terms of both securing a strategic water supply and controlling pollution.[36]

It seems obvious that both countries are concerned about the implementation of any agreements, especially on water. They will therefore probably favour a comprehensive water monitoring verification programme (for further discussion on this, see *Chapter 4*).

Up to now, neither the Parties nor external brokers such as the US have come up with any solution to this challenge – except to focus on the exact delineation/demarcation of the border. *Chapter 4* outlines a possible way out for both Parties, attempting to reconcile both positions and concerns.



Chapter 4

Proposed solutions to the water dispute over the Golan Heights

The need for a comprehensive solution to the water dispute

Any water proposal would be viewed as part of a larger agreed-upon package. Sometimes, this means that concessions in one area may yield benefits in another. The water-land conflict-nexus over the Golan Heights is of such significance, although strategically different for both Parties, that a comprehensive solution ought to be achieved. In this context, a solution to the water disputes means not only reaching an agreement on exact borders, disengagements, legal rights and handing-over of territories, but also taking into account the practical implementation and enforcement of any water agreement from a short-, medium- and long-term perspective.

Why make public the following proposed solution?

As with any proposals made public in the Middle East, this one must be viewed at a point in time (2006). For years there has been little, if any, progress in the negotiations. There are reasons to believe that if the political climate had been more conducive to talks, indirectly or directly the proposal might have been further communicated bilaterally before public disclosure. A few leaders from Syria and Israel did however receive the proposal shortly after the failed Geneva meeting. From a long-term perspective, it is therefore to be hoped that the two countries may use this proposal as constructive input towards obtaining public support for the fact that these matters are complex and important for both countries, and that each Party has legitimate concerns.

Each Party will have to display not only utter flexibility in reaching an agreement, but equally importantly, a full commitment towards implementing it.

A solution to the water disputes means not only reaching an agreement on exact borders, disengagements, legal rights and handing-over of territories, but also taking into account the practical implementation and enforcement of any water agreement from a short-, medium- and long-term perspective.

What does the proposal attempt to achieve?

This proposal attempts to make both Parties' positions compatible with each other in such a way as to allow both Syria and Israel's concerns (often described as underlying objectives[x]) to be met.

More specifically, this means that the Israeli positions on ensuring the continuation of Israel's current water use in quantity and quality are

x In negotiation terms: the Parties' interests.

to be compatible with Syrian territorial claims, including their demand to develop and thereby re-establish a population of up to 450,000[XI] on the Golan Heights.

In addition, implementation of any agreement is expected to be ensured by a comprehensive water verification and monitoring programme.

This proposal is valid irrespective of the 'exact' location of the disputed section of the border, as long as the interpretation of territorial sovereignty includes the conditions below.

Only a part of the pre-4 June 1967 border is disputed

So far, the negotiations indicate that only the sections of borders discussed above are disputed. As long as the principles in this proposal are agreed on, the exact 'drawing down to the metre' might be carried out at a later stage and at a more technical level. One prerequisite of the proposal is that Syria will not claim riparian rights to Lake Tiberias (which has not been done to date).

...implementation of any agreement is expected to be ensured by a comprehensive water verification and monitoring programme.

As a minimum however, the ten-metre strip seems to be already agreed on. This is, in recent years and in geographic terms, around 120-300 metres away from the June 1967 water-line intersection. Syria gets 'all' its geographic territory back, and Israel will achieve 'full sovereignty of the lake' and the most wanted 'access-buffer strip' to the lakeside.

XI Implying an average population density of about 389 persons/km^2, assuming no geographical resettlement restrictions within the 1,158 km^2 of the Golan Heights. It is assumed that there were around 130,000 Syrians on the Golan prior to 1967 (Maar'I and Halabi, 1992).

The concerns of both Parties will be addressed

Respecting Israel's 'current use claim' and Syria's 'territorial rights' (by meeting the water use needs of the above-mentioned population increase) would entail additional costs to Syria in the form of measures to mitigate water pollution and replace net water consumption.

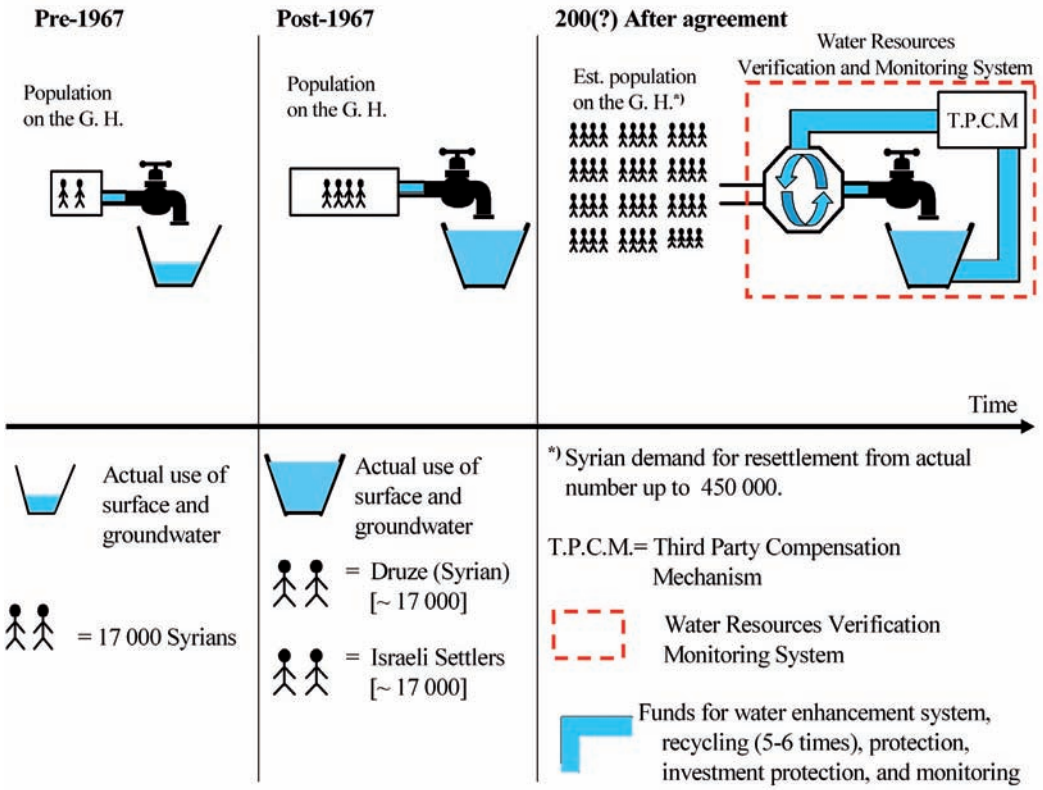
Any agreements between the two states would require support from other Arab countries and the wider international community. Any deal would therefore entail a commitment from the international community assisting the Parties to establish and implement any agreements.

The basic principle is that Syria should be able to resettle a population beyond the 1967 figure, but also receive compensation from the international community that guarantees their ability to maintain current Israeli water quantity and quality downstream (given the agreed maximum population level)[37] – see illustration of the proposal in *Figure 2*.

More specifically, the proposal consists of the following principles:

1. The international community, and especially Third Party constituencies (hereafter called International Third Parties – such as the UN and World Bank as well as groups of nations such as the US, Russia, EU, Japan, Germany, Switzerland, France, Nordic countries and some Arab States) offer to cover the additional costs of providing and protecting the water resources from pollution up to an agreed-on maximum population level, i.e. the maximum population that Syria has a right to on the Golan Heights must first be determined/ negotiated. These additional costs (hereafter called the maximum incremental costs) are

Figure 2. Past, present and possible resettled population on the Golan Heights in relation to water resources usage with the third party compensation mechanism (TPCM) and water monitoring/ verification system



calculated as Syria's real costs[XII] of water resource management measures[XIII] that guarantee maintaining current Israeli water use downstream[XIV], given the agreed maximum population level. Exactly what incremental costs may be considered is discussed below.

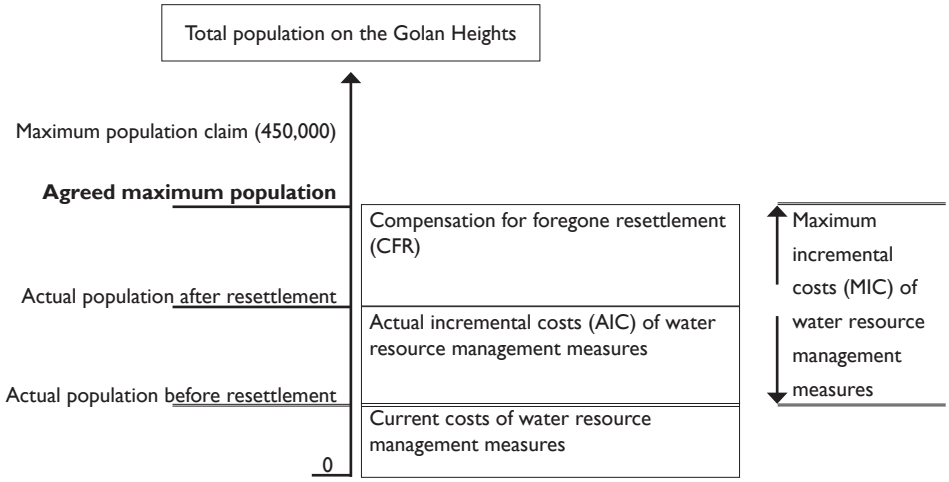
2. The actual population resettled may be lower than the agreed maximum population. The International Third Parties will, however, provide compensation for the actual incremental costs incurred, as well as compensation to Syria for resettling fewer people than the agreed maximum population. The latter will hereafter be called compensation for foregone resettlement.
3. Compensation for foregone resettlement may be used freely by Syria. It may be taken as compensation for the costs of alternative resettlement sites within Syria for that part of the maximum population that would have settled the Golan Heights.
4. Compensation for foregone resettlement (CFR) is defined as the maximum incremental costs

XII Real capital, operation, maintenance and certain opportunity costs.

XIII Water resource management measures encompass enhancement of water quantity and quality characteristics.

XIV Defined as the Upper Jordan River and Lake Tiberias.

Figure 3. Costs related to implementation of suggested measures



(MIC) minus the actual incremental costs (AIC) of water resource management measures. In other words, maximum incremental costs = actual incremental costs + compensation for foregone resettlement (see *Figure 3*).

5. The maximum Syrian claim of a population total of 450,000 on the Golan Heights may not be the maximum population finally agreed on by the Parties as the basis for calculating maximum incremental costs.
6. A separate publication by COMPASS defines the methodology for determining maximum incremental costs at different possible levels of maximum population agreed on by the Parties.[38]

Alternative population levels considered in the publication are listed in *Table 2*.

Compensation principles and water resources constraints

Compensation principles

Compensation may include a set of various and, from an academic perspective, quite intriguing factors. However, as an attempt to narrow down

Table 2. Alternative scenarios for agreed maximum population on the Golan Heights

	Scenario 0 (baseline)	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Maximum agreed population	17,000	100,000	200,000	300,000	450,000
Incremental population	0	83,000	183,000	283,000	433,000

Note: Assuming total relocation/withdrawal of all Israelis presently in the Golan Heights.

Source: COMPASS, 2005.

this discussion to the essential point, namely to come up with some figures that could give a realistic picture of such compensation, some assumptions are made in the calculation.

The compensation mechanism has been developed based on at least six assumptions:

1. Agreement on the maximum population that Syria has a right to resettle on the Golan Heights.[39]
2. Agreement on the principle that only incremental (additional) costs to the Parties due to the agreement will be admissible. This implies that compensation for investments in water resource management infrastructure, which is not a consequence of the Agreement, will not be given to either of the Parties.[40]
3. Agreement on the valuation principle that compensation for foregone resettlement will be measured in terms of avoided incremental costs of water resource management measures.
4. Agreement that actual incremental costs will be calculated using the most cost-effective water resource management options available relative to the agreed-upon standards that guarantee continued current Israeli water resource uses.[41]
5. Agreement on the interpretation of water quantity standards that guarantee continuation of current Israeli water resource uses.
6. Agreement on the interpretation of water quality standards that guarantee continuation of current Israeli water resource uses.[42]

Water resource use constraints

Certain suggested standards and constraints on human resettlement to the Golan Heights would follow from the draft peace agreement and common practices in water resource management. Total mitigation costs will be a function of the levels of these water resource use constraints.

Water quantity constraints

Israel's claim to continued 'current use in quantity' of all surface and underground waters, and for 'measures to prevent depletion' of Lake Tiberias and Upper Jordan River and its sources will be interpreted as follows:

1. Upper Jordan River at mutually agreed-on monitoring stations:
   a. Current total annual flow is maintained[43].
   b. Current seasonal flow patterns must be maintained[44].
2. Underground water[45]:
3. Underground water level is established and new wells must not decline below current annual average groundwater level.
4. Maintaining current flow and variation should ensure protection of aquatic communities.
5. Respecting these quantity constraints means that any increase in net water consumption will have to be replaced by importing water from areas of Syria outside the Golan Heights. Increases in net water consumption can be expected with any population increase above current levels due to water consumption in the new domestic, service, agricultural and industrial sectors.
6. Total net water consumption of domestic, service and production sectors on the Golan Heights will depend on agreement of target levels for wastewater reclamation and reuse.

Water quality constraints

1. Israel's claim to continued 'current use in quality' of all surface and underground waters, and for 'measures to prevent contamination and pollution' of Lake Tiberias and the Upper Jordan River and its sources, will be

Table 3. Different scenarios of the cost of resettlement

Cost types	Capital costs (million US$) Low estimate	High estimate	Present value of recurrent costs (million US$) Low estimate	High estimate	Source in text Table
4.1 Costs of monitoring	1.4		1.5 (12%) 1.8 (6%)		1.1
4.2 Cost of water supply	Capital costs of distribution on GH not included		145 (12%)	499 (12%)	2.1
			248 (6%)	853 (6%)	
4.3 Costs of waste water collection and treatment	80	215	31 (12%) 52 (6%)	86 (12%) 145 (6%)	3.1
4.4 Costs due to solid waste disposal	All costs of waste transport are assumed recurrent		34 (12%) 63 (6%)		4.1
Total incremental costs (12% discount rate)	81+	216+	212	621	
Total incremental costs (6% discount rate)			356	1063	

Note: All costs in US$ for year 2000. (%) indicates discount rate used to calculate present values. The present value of total incremental costs is obtained by summing horizontally along the rows of *Table 3*.

** See COMPASS (2005).*

interpreted as maintenance of the current level of predefined water quality parameters – hereafter called the current quality standard[46] (water quality parameters that may be considered in the current quality standard are discussed in COMPASS' publication).

2. Respecting these quality constraints means that any increase in wastewater generation will have to be completely mitigated by treatment processes.[47] Increases in wastewater generation can be expected with any population increase above current levels, due to net use of water in new domestic, service, agricultural and industrial sector processes.

Land use constraints

1. Respecting water quality constraints in terms of nutrient loading and turbidity requires certain restrictions to be placed on land uses, particularly in agriculture. The types of costs associated with these constraints are discussed further below.
2. Full Syrian territorial sovereignty implies that any previous delineation of areas, such as nature reserves, will be determined by Syria.
3. Approximately 21.2 per cent (246 km^2) of the Golan Heights is currently managed as a nature reserve for conservation of endangered flora and fauna. Other conservation areas may be set aside for the protection of certain sensitive groundwater infiltration zones. In these areas all human settlement, agricultural and industrial activities would be excluded (exclusion of these land uses would entail opportunity costs – foregone net benefits – that are further discussed in COMPASS (2005)).

What are the estimated costs for such compensation?

Based on the assumptions outlined, the following cost types in *Figure 4* are taken into account. The proposal includes the first approximation order-of-magnitude cost estimates for cost types 1-4.

Based on the assumptions outlined, and as calculated in COMPASS (2005, *Third Party Control Mechanism of the Golan Heights*[48]), *Table 3* gives an illustration of the costs involved.

The total costs

The present value of total incremental costs would be in the order of US$293-837 million using a discount rate of 12 per cent, or US$446 million–1.279 billion using a discount rate of 6 per cent. Although these are in the order of magnitude estimates, they are considered 'low end' (see the technical assumptions detailed in the *Annex*).

In political and technical terms, a total amount of about US$1 billion is probably realistic. The exact amount would be set during implementation of the agreement.

Figure 4. Various cost estimates

Costs of monitoring (Type 1)
Costs of water supply and treatment (Type 2)
Costs of wastewater collection and treatment (Type 3)
Costs of solid waste disposal (Type 4)
Costs of measures to reduce diffuse discharges (Type 5)
Opportunity costs of water rationing (Type 6)
Opportunity cost of land use restrictions (Type 7)

Comprehensive water resources verification and monitoring systems

As outlined above, both Parties are concerned about compliance with any agreements. It seems obvious that both Parties not only want, but would even insist on, some sort of assurance of a mutually accepted Third Party's verification and monitoring of the other Party's implementation of the agreement. Due to the embedded scepticism and suspicion of the other Party's intentions, comprehensive verification and monitoring systems that are specifically tailored to the water resources should be established as part of any peace agreement.

Documented compliance with such systems would eventually reinforce the Parties' conviction that they made the right decision.

Such a mechanism is a prerequisite for implementation. The other important element in this proposal is therefore establishment of a comprehensive 'water resources verification and monitoring system' involving both countries and a Third Party as a guarantor. Internationally, the importance of monitoring agreements is increasingly recognized.[49] Monitoring systems based on a standardized concept would provide continuous, reliable and standardized data with respect to climate and water quantity and quality for the water resources in question. Such systems would verify all phases of the water monitoring programme to ensure that it meets the intention of the agreement.

When an overall agreement on the Golan Heights has been reached, including an implementation plan, a 'Golan Heights Water Resources Monitoring System' (GWMS) should be established. This would take into account issues of pollution, water quality and quantitative aspects as well as procedural systems. The Parties should agree on rules for setting up and operating monitoring and verification programmes, including measurement systems and devices, analytical techniques, data processing and evaluation procedures.

The complex relationship between natural conditions and the manmade impact on water resources requires that the GWMS define status and trends, and identify possible early warning events. Such a GWMS will form the basis for a continuous verification process that may consist of four parts: planning; implementation; operation and maintenance (O&M); and reporting:

- During the planning phase, verification will focus on the proposed programme ensuring that the proposed procedures have been prepared. The main focus will be on the administrative procedures.
- During implementation, verification will focus on the monitoring sites, such as location, instrumentation and equipment, operation, data collection and processing, and reporting. Furthermore, the presence of relevant procedures for O&M, including analytical and monitoring methods to be used, data handling and reporting will be verified. The main focus will be on the technical procedures.
- During operation and maintenance, verification will include the monitoring stations, personnel, laboratories and other institutions participating in the programme. It will check that the procedures, manuals, O&M plans and contingency plans that have been prepared are used by programme participants, and that the monitoring programme is operated in conformity with these procedures as well as with written agreements and regulations.
- Verification of the reports will ensure that they are in accordance with the procedures made for the three types of reports: executive summary; data report; and O&M report. Verification statements will be prepared based on the verification documents/reports.[50]
- Non-conformities identified will be reported in draft reports, and corrective action must be undertaken by the national programme manager within a given deadline. Follow-up of the corrective action will be carried out and a final report prepared.

Systematic, independent and documented auditing processes will be established by a recognized Third Party arrangement.

Another effective confidence-building measure would be approved procedures for mutual visits and exchange of information between the Parties. This should ensure complete transparency, maximum efficiency and accountability. Reliable and auditable data collection principles and procedures are an integral part of that, and the Parties should have access to information about the GWMS according to agreed-upon rules. This access would contribute to creating mutual trust in the GWMS.[51]

Syria and Israel would, in mutual agreement, decide on the scope of the GWMS. Criteria for the selection of monitoring sites, monitoring programme and data assessment will then be established. A crucial question is how to deal with non-conformity data. Procedures for handling non-conformity should be worked out, and a proposal on how to deal with this developed very early in the process.

Initially, a Third Party would, as an independent auditor, verify and certify (if requested) the whole system arrangement and its establishment in conformity with agreements, regulations and procedures. It might also be that a third Party should have overall responsibility for the operation of the GWMS in such a way that both Parties are confident with the work and quality of the results obtained.

Transforming the proposal into reality

This proposal has been developed over the years in order to address the real concerns of Syria and Israel. It aims to reflect their genuine interests. However, as in every real-life situation, there are different ways of looking at such a proposal. Most likely, both countries will favour comprehensive arrangements related to the water conflict. Syria has done this recently in its bilateral agreement with Lebanon on Nahr el Kabir River signed in 2003 and in the Orontes River agreements, which involved a set of mechanics to be put into action.[52] It has also made clear that such monitoring and verification programmes are desirable in the Euphrates and Tigris context.[53]

Likewise, Israel's peace treaty with Jordan and the preliminary agreements with the Palestinian Authority are meticulous and contain detailed provisions for implementation.

What about the costs of implementation?

How would external stakeholders view these cost estimates compared to the possibility of no agreement? Over the past century, 'compensation' in various forms has been used both to secure settlements and to increase the chances of maintaining such arrangements.[54] Any extra-regional benefactors take a self-interested perspective and calculate the economic cost *vis-à-vis* the foreign and economic interests of their country in combination with its political course. Historically, for example, the US has had a different perspective on the Middle East to the French, but both would probably consider the economic cost to be low compared to the long-term political and economic benefits of peace and increased stability in the region.

The 'peace dividend' therefore seems to be high enough for international actors to commit funds to such a compensation mechanism.[55]

In addition, multilateral institutions such as the World Bank and United Nations (UNDP and UNEP) have for years set up funds for such purposes, such as the Global Environmental Facility (GEF)[XV] and Nile Basin Initiative. The role of the World Bank with its technical and financial expertise corresponds to its desire to focus on such activities.[56]

The two countries in question may, however, put different weights on various factors in this proposal.

A Syrian perspective on the proposal

The majority of the population in Syria will probably agree on a peace agreement with Israel as long their leadership is in favour of it, bearing in mind the following principles:

1. Any peace must be based on a formula that should not be underestimated from a Syrian perspective: "land for peace". To date, this has been interpreted as the territorial sovereignty of Golan.[57] The present proposal specifically addresses this matter. As discussed earlier, any other matter that follows such an agreement appears secondary to this formula.[XVI]

For the Syrians, return of occupied land on the Golan is a national symbol and a matter of pride.

XV Dealing with four areas: international water, forestry, protection of the ozone layer, and mitigating global climate change (see www.gefweb.org/)

XVI Such as military disengagement zones and normalization, for example in trade and diplomatic representations.

Photo 11.
The watershed of the Baniyas River on the Golan Heights (northwards)

2. The principle of territorial sovereignty is interpreted in such a way that the 'right to return of the foregone population of Golan' must be accepted.
3. There is, to some degree, uncertainty about the extent to which progress on establishing a Palestinian State is necessary for a deal on Golan. Some have argued that this is desirable in the eyes of the Syrians – and of the Arab world as a whole.[58]

There are strong reasons to believe that Syria would favour peace with Israel.[59] Such a position cannot be isolated from events such as the US-led coalition invasion of Iraq in 2003 and subsequent US sanctions against Syria in 2004. However, one should not anticipate that Syria would sign a peace treaty if it feels it is being cornered. Any deal must be mutually perceived as honourable and fair. This is true not only from a political point of view, but equally importantly from an emotional, ideological and economic point of view. For the Syrians, return of occupied land on the Golan is a national symbol and a matter of pride.

Specifically, as long as the two conditions (1 and 2) above are fulfilled, the peace dividend for Syria is potentially large. A normalization by the international community and specifically a lifting of US sanctions may pave the way for rapid economic and social development.

An Israeli perspective on the proposal

There are equally strong reasons to believe that Israel would favour peace with Syria. Quite a few scholars have argued that former Prime Minister Barak was ready to provide the Syrians with the border delineation/demarcation (through the so-called 'Rabin Deposit'[XVII]) (see Ross, 2004: Chapter 22; Enderlin, 2003: Chapter 3; Swisher, 2004: Chapter 8). This was some time ago,

XVII The late Prime Minister Rabin deposited a sort of 'bottom line' with President Clinton that should be applied in the end-game if a peace between Israel and Syria can be reached.

however former Prime Minister Peres and later Barak confirmed the 'deposit'.

One should not, however, underestimate the embedded psychological, intellectual and political scepticism as regards relying on the Arab countries' compliance with any agreements on strategic water resources.[60] The academic literature is quite interesting in discussing and reflecting various options and strategies, but it all boils down to the following question: Do the benefits outweigh the risk and costs (see for example Rabinovich, 2004)?

Most Israelis and their leaders may answer yes to that question[61], but at the same time add: What kind of insurance for compliance do they get, for what kind of cost and at what risk? In the end, such a decision would have to be made by the Israeli leadership together with the people. It will definitely be made according to the overall political and psychological climate in the region.

Most Israelis and their leaders may add: What kind of insurance for compliance do they get, for what kind of cost and at what risk?

In any case, the options exist for sustainable solutions.

Concluding remarks

Syria and Israel have much to lose and much to win by resolving the conflict over the Golan Heights. When the timing seems right for one of the Parties, it does not appear so for the other side. The failed Geneva meeting of March 2000 was in fact a missed historic opportunity, but may have occurred due to lack of a practical solution to the disputed waters. This proposal is not the only way of handling the water file, but rather one way of taking the Parties' key concerns into account.

Since the year 2000, little progress has been made. This may be because of the convoluted geo-political situation in the region. However, the 'irreconcilable positions' are the same – and proposals such as this may become even more relevant than before.

Chapter 5

A proposed water agreement between Israel and Syria

Preamble

The following text is a preliminary proposal for an input to a possible water agreement (as part of a peace treaty) between Israel and Syria – hereafter known as the 'Water Agreement'.

Reservations: The author does not expect that a water agreement between the two countries will look exactly like that proposed. Any agreement is subject to political and technical negotiations. It does, however, attempt to illustrate what some key issues in such an agreement might look like (some formulations are derived from the 'Shepherdstown text').

Article I. Resolution of all water issues

The Parties recognize that the full resolution of all water issues between them constitutes a fundamental element in ensuring a stable and lasting peace based on international principles and good neighbourliness, the Parties have agreed to establish arrangements that ensure the continuation of Israel's current use in water quantity and quality of the surface and groundwater in a selected part of the Upper Jordan River/Lake Tiberias basin (north of … degree of latitude and east of … degree of longitude) pursuant to Article … as detailed in Annex … while at the same time enable Syria to utilize the water resources for its social and economic development on the Golan Heights.

Article II. Bilateral Water Management Committee

For the purposes of this agreement as outlined in Article 1 and Annex …, the Parties will establish a Bilateral Water Management Committee which has a supervision and enforcement capacity as outlined in Annex … The Quartet [UN, US, EU, and Russia] will be permanently represented (with each of its members) in the Committee and act as a guarantor for this agreement.

Article III. Third Party Compensation Mechanism

- (i) As a basis for the agreement outlined in Article I and II, the Parties have together with the Quartet agreed to establish a Third Party Compensation Mechanism which will serve the purpose of enabling Syria to develop the water resources while preventing pollution and depletion of the resources in accordance with Article I.
- (ii) The Mechanism will technically and financially be administrated by a secretariat managed by GEF's implementing agencies under instruction of the Bilateral Water Management Committee.

Article IV. Water monitoring systems

All agreed water monitoring systems in a selected part of the Upper Jordan River/Lake Tiberias basin – as detailed in Annex … – are subject to verification by the Bilateral Water Management Committee. The committee shall approve verification procedures before they are put into force.

Article V. Notification of any planned measures

The Bilateral Water Management Committee shall be notified of any planned measure which may have an adverse effect on the selected basin environment for verification and approval. Such notification shall be accompanied by technical data and information including the results of any environmental impact assessment.

Article VI. Licensing of wastewater discharges

The Bilateral Water Management Committee shall license wastewater discharges. The water discharge licensing shall include all types of Return-flow and shall contain directives on how to handle unforeseen outlet situations.

Article VII. Protect the environment and prevent pollution

The two Parties shall, individually, and where appropriate jointly,

- (i) protect and preserve the ecosystems of …, and
- (ii) prevent, reduce and control pollution that may be in contradiction to the agreement outlined in Article 1.

Endnotes

1 Several military leaders have made such statements, and recently the Israeli general Moshe Yaalon: "From the point of view of military requirements we could reach an agreement with Syria by giving up the Golan. The army could defend Israel's borders wherever they are": BBC, 13 August, 2004 (news.bbc.co.uk/go/pr/fr/-/2/hi/middle_east/3561334.stm).

2 This is also illustrated by the fact that former Military Chief of Intelligence General Uri Sagy who became the Chairman of the Israeli water company Mekorot also negotiated the water questions during the Shepherdstown talks. Or as stated by Israeli Minister of Agriculture Ya'acov Tsur who served both under Prime Minister Rabin and Peres when the evacuation of the Golan was seriously negotiated in the *Jerusalem Post,* 27 December 1995: "The water resources on the Golan [are] a critical, vital and even fateful matter in terms of the future of the State [of Israel]. I have to say that I am not aware of any replacement for this water" (see also: Proceedings of the Herzliya Forum Conference: 'Water Crisis in Israel', in: Starr (2001: 30). Or as stated by the authoritative Israeli journalist on strategic matters (Shiff, 1993): "If the Golan's military significance for Israel is primarily operational, specifically the defence of Galilee, the need to defend the water sources is absolutely strategic and indeed existential".

Or as stated in the Israeli newspaper *Ma'ariv,* 19 July 1995, quoting Prime Minister Rabin when he was addressing some Israeli ambassadors: "the greatest danger Israel has to face in the negotiations with Syria is the possibility of losing control over the Golan Heights' water resources".

3 The description of the resource geographical environment of the Golan Heights is based on the following open sources references:

- Hydrological Service, 1999.
- Arad and Bein, 1986.
- Bergelson, Nativ and Bein, 1998.
- Rimmer, Hurwitz and Gvirtzman, 1999.

4 Shuval (1994: 162) indicates between 40 and 50mm.

5 The planned project includes: a) restructuring and completing the internal wastewater system; b) construction of a new main line, 11 km long, that will connect the three big villages; and a wastewater treatment plant near Bukata. The treated effluent will be used to irrigate large areas of apple plantation in the region. Plans for the year 2010 predict an annual treated water production of 1.1 MCM (130 m^3/hour). The approved programme includes collection systems, oxidation basins, and a reservoir for effluent water on the Rokad River.

6 In 1955, the US President sent out an envoy, Ambassador Johnston, to develop a plan for allocation of the water in the larger Jordan Basin. See details in Murakami (1995).

7 Cf. Naff (1994) which gives a detailed description of the Syrian-Israeli relationship.

8 Confirmed also by US State Secretary Madeline Albright, 2004.

9 Which started on January 3 in the small American city of Shepherdstown in the State of West Virginia, not far from Washington DC, so the US President flew to and fro daily.

10 See Ross's (2004) detailed accounts (especially pp. 517 and 521 and Chapter 22), and as stated by the Israeli Negotiator Reserve General Uri Saguy, "We really defined the essential problems of our relationship with Syria"; and "The border; the question of the line June 4, 1967; water" as quoted in Enderlin (2003: 126).

11 This point was underscored in Syrian President Bashar Al-Assad's first comprehensive speech to the Arab League in September 2000, such as: "certainly it will use them [ed: i.e., the power elements and cards related to, among other things, Lebanon] for the service of the national cause, namely the issue of Golan. But before that, it will use them in the service of the pan-Arab cause…"

12 Presented in *Al-Hayat* (a daily Arabic-language and London-based newspaper) on 9 January 2000 and in the Israeli Newspaper *Haaretz* on 13 January.

13 At the Intercontinental Hotel in Geneva on 26 March.

14 Syria raised this matter with the author already in the December preceding the Shepherdstown talks in January 2000 as well as just after. The Israeli had a passive approach to this matter as the demand was not placed high on the agenda by the Syrians since the final border was demarked.

15 The most detailed assessment of this might be found in Ross (2004: 580-590), but it should also be viewed in relation to a slightly different perspective by Swisher (2004).

16 The adoption by the US Administration of the Syrian Accountability Act of May 2004 and the subsequent UN Security Council Resolution 1559 have not fostered that relationship.

17 See President Clinton's senior Director of Near Eastern Affairs at the National Security Council, Bruce Riedel, "In retrospect the US should have pressured harder to get a deal with Syria and put down own ideas about resolving the outstanding territorial issues on the front" as quoted in Swisher (2004: 122).

18 See further discussions about the demilitarized zones, their status and "authoritative interpretation" in Naff (1994), in Muslih, (1983) as well as in Feitelson (2000).

19 Cf. also the statement by President Clinton's advisor Gemal Helal regarding the US perception of the Syrian position (as quoted in Swisher (2004: 119). See also the newly published article in Science Po, Paris, by Marwan Doudy that deals extensively with this issue (Doudy, 2005b).

20 The horizontal distance from the present land/water intersection to the pre 4 June 1967 line varies between 40 and 200 metres due to different slope gradient of the terrain.

21 Ibid: President Clinton was citing President Hafez Al-Al-Assad of Syria in the last meeting on a peace for the Golan Heights between Syria and Israel as he realized that the peace talks between the two countries broke down – in Geneva on 27 March 2000: "[President Al-Assad] wanted to sit on the shore of the lake and put his feet in the water" (in Lake Tiberias)" (Enderlin, 2003).

22 According to the draft Syrian-Israeli agreement on water from Shepherdstown, January 2000.

23 For example: the Syrian President Bashar Al-Assad's statement in July 2001 to the leading Saudi pan-Arab daily *Asharq al-Awsat:* Q: ".. are the Israeli positions still the same concerning the [eastern shore line of Lake Tiberias] and .. the water issue?" Al-Assad: "We refuse to discuss any issue unless agreement is reached on the essence, on the basic principle ...What is the point of agreeing on the water issue if we agree on the land, which is the main issue? Hence, Syria will not discuss any issue until it guarantees the return of all its territory up to the June 4 [1967] borders." (As translated from Arabic by the *Middle East Mirror*, 9 February 2002.)

24 Syrian Vice Foreign Minister Walid Moalem in interview with Swisher (2004).

25 This is also illustrated in the paper presented by then Syrian Head of the International Water Department at the Ministry of Irrigation, Eng. Abdul Aziz Al Masri (2003).

26 However, this does not coincide with President Clinton's statement that if the Israeli insisted on guarantees on the quantity and quality of water flowing from the Golan into the lake, "Syria agreed as long as it got the same guarantees on its water flow from Turkey", (Clinton, 2004: 886). The author's interpretation of this is that Syria believed they could obtain US assistance in pressuring Turkey. Today, after the US invasion of Iraq, the situation might be almost the opposite.

27 Some observers argue that Syria may want to demand water from Baniyas in order to give it to the Arab population downstream of the lake (cf. Hoff, 2000: 160). The author does not believe that Syria would link such an agreement with Jordan and the Palestinians as that would set a precedent by hydro-politically linking the basins.

28 According to the average population growth over the past 35 years. This figure should however, be open to being further determined/negotiated. See also the description of the Syrian demand on returning population in Gruen (2000) or as anticipated by Hoff (2000: 162).

29 As for example outlined in Foreign Minister's Farouk al-Shaara's speech on 16 December at the White House Rose Garden in Washington, DC. See also Swisher (2004: 72).

30 Alster (1996) represents one of the more authoritative Israeli points of view.

31 Riparian rights give in accordance with international law a set of rights and obligations (see for example the 'Helsinki rules' and the 'UN Framework Convention on the Law of Non-Navigational Uses of International Watercourses').

32 The 'Clinton Administration Proposal to Jerusalem and Damascus' in the Shepherdstown negotiations in January 2000.

33 See the Israeli letter to the UN Security Council of 21 November 2002.

34 See also Hoff (2000: 152), "Israel will likely seek Syrian assurances that this reservoir network will not be expanded and that steps will be taken to mitigate pollution runoff".

35 The Israeli Water Commissioner Meir Ben Meir, 3 January 2000, as translated by Martin Sherman, Proceedings of the Herzliya Forum Conference: Water Crisis in Israel, ed. J. Starr, April 2001.

36 Mekorot (1996: 19; IV in *Summary and Conclusions*); Sherman (2001).

37 This proposal is in line with the interpretation of sovereignty in terms of both 'rights' and 'obligations' (to among other things protect the resources) in relation to water resources (see the introductory part).

38 See COMPASS (2005). Determining what proportion of maximum incremental costs is actual incremental cost, and what proportion is compensation for foregoing resettlement, is not required at this point in time. In other words, deciding on "the size of the pie" must take place before deciding on "the sharing of the pie" between actual incremental costs and compensation for foregone resettlement.

39 Without agreement on the level of Syrian resettlement there is no basis for calculating maximum incremental costs.

40 It must be determined whether Israel will claim any form of compensation for existing infrastructure. An argument against such compensation would be that the infrastructure would continue to benefit mainly Israel, by reducing discharges of pollutants and reducing water consumption (e.g. drip irrigation systems).
41 Using the cost-effectiveness principle avoids inflating maximum incremental cost.
42 Subject to agreement on the activities that are to be considered as part of current Israeli water uses.
43 Baniyas River may get a separate arrangement, but for simplicity's sake is not included in this calculation.
44 Possibly defined as a minimum average flow during the dry season months (month 1-month 6), and a minimum average flow during wet season months (month 7-month 12).
45 Are any of the aquifers under the Golan Heights also tapped by Israeli wells (that are located outside the 4 June 1967 border)? If so, a total sustainable rate of withdrawal must be calculated and allocated between Israel and Syria.
46 An alternative interpretation of "continued current use in quality" is that current uses can still be continued at some lower water quality level – hereafter called a safe minimum standard of water quality. Wastewater treatment costs would then be lower under the safe minimum standard of quality than under the current quality standard.
47 There are other examples where one country has agreed to meet certain water quality standards and a water treatment plant has been installed at the border such as the Yuma area between USA and Mexico on the Colorado River. See Frank Leitz and Ewoldsen (1978).
48 See COMPASS (2005) www.compass-org.ch/Selected_literature/selected_literature1.htm
49 See for example the guidelines of OECD (1994) and the World Bank (1996).
50 Revised technical non-paper (2000) from Veritas to CESAR.
51 As in the case of the disarmament process in the Balkans as conveyed by the Chief Disarmament Negotiator General Vidleik Eide [former CHOD] (personal communication, February 2000).
52 Cf. the most comprehensive description and assessment of these agreements is in Comair (2003).
53 Expressed through personal communications with relevant ministers over the years.
54 As described historically in several cases from the Middle East by Fromkin (2001) and more recently in the case of the Egyptian-Israeli and the Jordanian-Israeli peace accords.
55 See also the long-standing US Envoy, Ambassador Ross' statement (Ross, 2004: 772) when summarizing lessons learnt, "We can offer guarantees on security; financial assistance to demonstrate the material benefits of hard decisions, all of which may be important in helping each side to cross historic threshold". Cf. also ODI, ARCADIS and Euroconsult, (2001).
56 See World Bank Technical Paper (Kirmani and Rangeley, 1994), "It focuses mainly on the Bank's role in international water affairs and recommends that the Bank should play a more proactive role in promoting dialogue, improving data base and analysis, and assisting riparians in establishing co-operative arrangements to plan and use their water resources efficiently. Further, it suggests that the Bank should strengthen its capacity to respond to riparian requests for assistance in an objective, competent and effective manner." WTP 239, Washington DC, Retrieved from www-wds.worldbank.org/servlet/WDS_IBank_Servlet?pcont=details&eid=000009265_3970311122714
57 As emphatically stated by the Syrian President Bashar Al-Assad in July 2001 to the leading Saudi pan-Arab daily *Asharq al-Awsat* (as translated from the Arabic by the *Middle East Mirror*, 9 February 2002).
58 Cf. Syrian Foreign Minister's Al-Shara's speech (as he outlined the Syrian policy towards the negotiations with Israel) to the Arab Writers Union on 13 February 2000 (as quoted in Rabinovich, 2004).
59 See for example the Syrian President Bashar al-Assad's message on 24 November 2004 to (at that time) UN envoy to the Middle East Terje Rød Larsen, "… the Syrian leader has an outstretched hand to Israel and is willing to go to the negotiation table with Israel based on the relevant Security Council resolutions and the principles of land for peace, without conditions..." (cf. UN News service www.un.org/apps/news/printnews.asp?nid=12640), which was also repeated by BBC World Edition on 5 January 2005 on Turkey's Foreign Minister Abdullah Gul who spoke of "Syria's readiness for peace talks, during a landmark visit to Israel" (http://news.bbc.co.uk/2/hi/middle_east/4145587.stm).
60 Sherman (2001: 28) cites several Israeli scholars and politicians that have an "aversion to surrender control over water supplies to an alien power ..." as well as grave concerns regarding "non-compliance of the peace process".
61 Israeli Army Chief General Moshe Yaalon stated that Israel "could leave the Golan" and that "the move would not endanger Israel's security" (see BBC News 13 August 2004, http://news.bbc.co.uk/go/pr/fr/-/2/hi/middle_east/3561334.stm).

Part 2

Boiling point at the Upper Jordan River

the Wazzani Springs conflict between Lebanon and Israel

Abstract

The evolution of the relationship between Israel and Lebanon is complex, and in many ways hard to understand for outsiders. Most of the international attention has been on the civil war in Lebanon (which ended in 1990), the role of Syria, and the high tension in southern Lebanon that erupted in armed confrontation as late as July 2006.

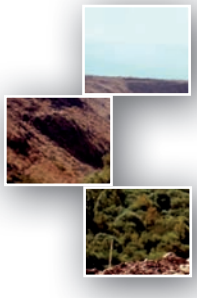
Quite a few key actors and observers argue that the Israeli–Lebanese relationship and, especially more recently, the role of Hezbollah as the dominant Party in the southern part, are predetermining the resolution to any dispute, whether this is over borders or water resources in that area.

This may be correct, but does not hide the fact that in case a solution is worked out, there should be some principles on which such an agreement may rest.

Part 2 describes the concerns of the Parties. It sets out the hydro-political complexity, especially in relation to the Golan Heights, and that any resolution here would be a precedent for resolution of the Golan dispute.

In short, the proposed solution contains provisions for a sharing/allocation regime of the Hasbani River, of which the Wazzani Springs are a part.

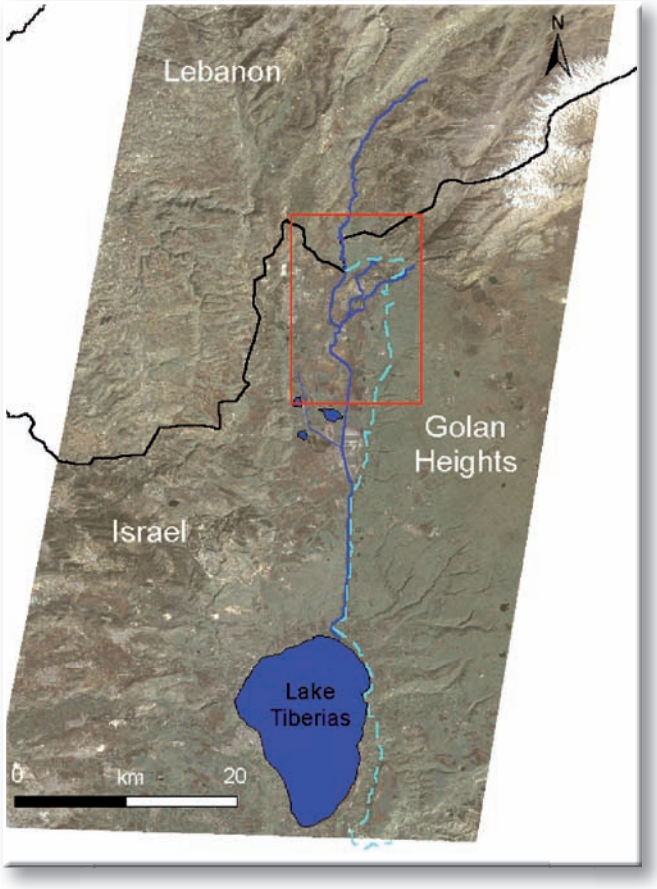
Photo 12.
Valley of the Hasbani on the Lebanese side of the border



Chapter 1

The water is boiling

Water in the southern part of Lebanon and northern part of Israel constitutes the Upper Jordan River Basin (in addition to the Golan Heights as dealt with in *Part 1*). It is located in a sensitive

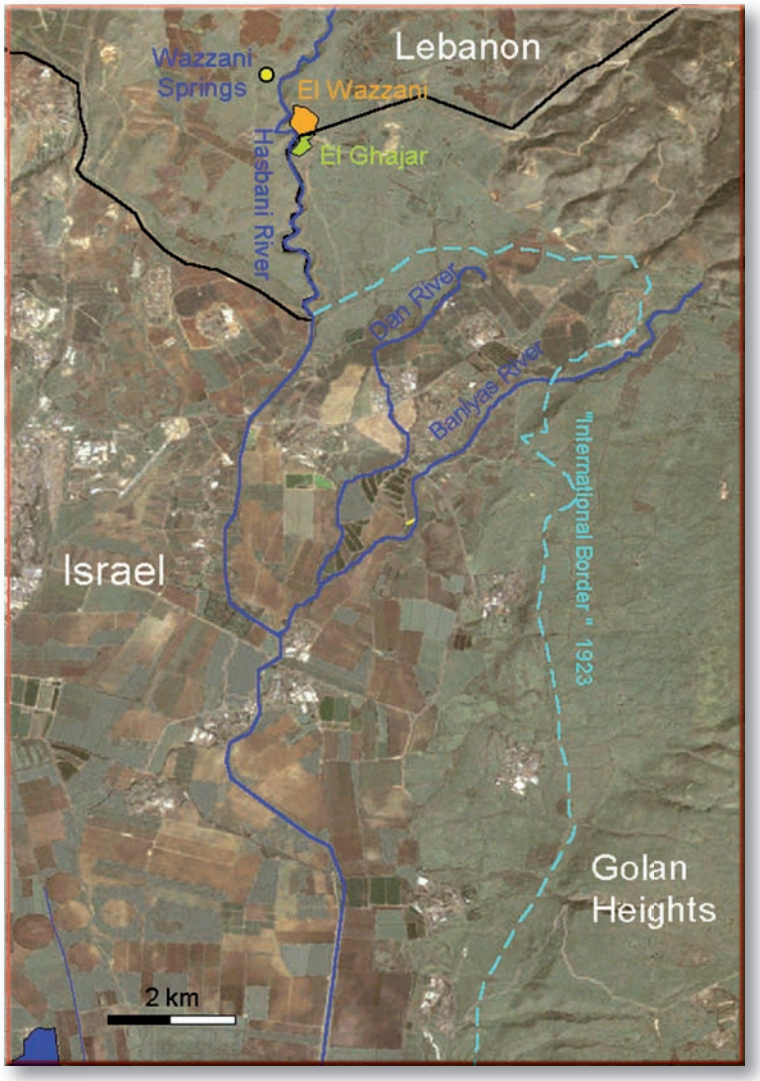


Map 7a-7b. Present and historic borders between Israel and Syria, and Lebanon (the black line represents the so-called 'blue line' set by the UN between Lebanon and Israel/the Golan Heights).

Note: Lebanon is disputing the area around the Sheeba Farms by claiming they possessed it before 1966.

Sources: Data from Lebanon derived from Landsat ETM and ESRI from other areas. Data processed by MAPS Geosystems s.a.r.l., Beirut, Lebanon. The 'International border' is based on data from UN Map 'Levant 50J19 Houle' and the current Lebanese/Israeli border is based on the UN 'Blue Line'.

Map 8. Location of the Wazzani Springs with the Hasbani, Dan and Baniyas Rivers



geopolitical area with a long history of quests for water resources since the establishment of the Jewish State in 1948. The only peace agreement signed to date has been with Lebanon in 1949 (i.e. a 'truce'). The particular dispute in question, the Spring at the Wazzani Village hereafter named 'Wazzani Springs', is located in Lebanon. It feeds the Hasbani River[I] that flows into Israel only 2 km downstream. When an agreement on the Golan Heights (with the pre-1967 lines in this area) comes into force, Syria may also become a riparian, since the river forms the border for just over 2 km.[1] Recently, the spring has been 'boiling', not because of a conflict over a huge amount of water, but because of national priorities, politics and a fragile hydrological system.

As part of its reconstruction and development efforts in the south, Lebanon wanted to use the Wazzani Springs, while Israel reacted strongly to this because of the way in which the Lebanese started to use the water. Their reaction was due to the extreme hydro-ecological sensitivity of the Upper Jordan River Basin and its vital inflow to Lake Tiberias as a stable freshwater supply to Israel (if this flow is not sustained, a significant amount of all water supply in Israel may be disrupted).[2] Such a mixture does not usually create favourable conditions for sustainable solutions.

I Or the Snir River as the Israelis call it. Hasbani River is more often used internationally, and is therefore used here.

This part of the publication does not attempt to duplicate descriptions of the hydrology of the area, nor the political analyses by eminent hydrologists[3] and political experts from the two countries and outside. Rather, it attempts to briefly describe the relevant historical and hydrological situation of the dispute. Based on some of the methodology and reasoning described in the introductory and preceding parts of the publication, it proposes a way to proceed in order to come to a mutually satisfying solution.

In simplistic terms, this conflict is discussed in terms of *the way it could be resolved* rather than *the exact allocation* of water. The reasons for this situation are complex, due particularly to popular public perception in both countries. Several scholars, such as Amery (2000), have studied the dispute, primarily from an epistemic perspective.[4]

As in the case of the two preceding water disputes discussed in this publication, any proposals should be careful in ascribing quick-fix solutions to such complex matters – especially due to the changing political climate in the region. The fact that this is a non-partisan proposal serves to increase its credibility for Israel, Lebanon and any other stakeholders, while also potentially removing obstacles towards a peace agreement.

Chapter 2

The border landscape in southern Lebanon and northern Israel

Thousand-year-old cedar trees are scattered throughout the rugged landscape of the high mountains in Lebanon. Even today, the beauty and mystery of the trees demand respect from anyone walking among them. According to the Scriptures, the Jews built their Temple in Jerusalem of the finest timber; the Romans burned them to make arms; and until recently they were unprotected and used for buildings and firewood. As the cedars have been precious throughout history, the water running down from the mountains has formed civilizations on the plains of Lebanon and in the fertile Hula Valley in Israel, contributing to the determination of the religious and political societies of the ancient and modern world. Their ability to use the water in the valleys and on the costal plains for agricultural and drinking purposes enabled, among others, the Phoenicians to develop a remarkable intellectual and technological supremacy 3,500 years ago. The fruits of civilization stretched out in all directions of the old world. Even today, the contemporary Western alphabet is derived from their work.

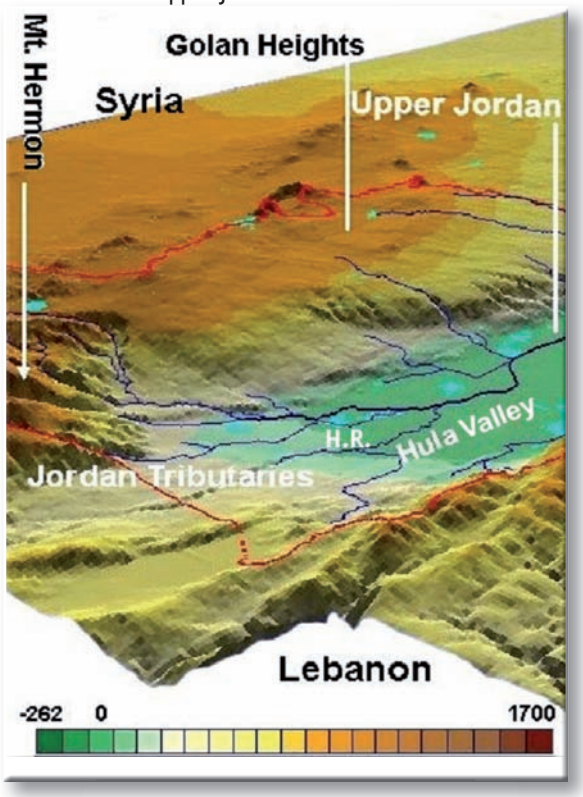
The southern part of Lebanon and northern part of Israel is a beautiful landscape with mountain and river scenery that is stunning to any visitor. The warm morning sun creates a magical light that makes picturesque spots on the slopes and waterfalls, and in the numerous villages in the foothills. The beauty of the landscape is hard to associate with its rugged contemporary history. Indeed, the area has been an arena for military clashes and political drama ever since the 1970s. The Israeli desire to secure the valuable water sources of the Upper Jordan River Basin is not new.

The water in the Upper Jordan River has played a significant part in history, even more so after May 2000, when Israel withdrew their troops in Lebanon from the so-called 'Security Zone' (see *Map 10*). Today, the disputed springs are located within the UN Peacekeeping zone, UNIFIL.

The *border landscape* in a Lebanese context

Lebanon is historically a part of the *Levant*. It was therefore a province under the Ottoman Syria region, becoming a sovereign nation as a result of the Anglo-French Convention in the 1920s. The present geographical location is quite similar to ancient Phoenicia. The borders cut across ethnical groups, confessional domains and natural resources. The Ottoman era reflected this mosaic in such a way that the cities of Aleppo (in today's Syria) and Tripoli governed

Map 9. Location of the Hasbani River (H.R.) seen in relation to the Upper Jordan River Basin



the north, Damascus the centre, and Sidon the south. Coastal Lebanon and the Bekaa Valley were directly governed from Istanbul, while Mount Lebanon had a semi-autonomous status.

A simplified description of the various religious affinities may explain this. Arab tribesmen settled the southern part after the spread of Islam in 700 AD and the Christian Maronites settled in the mountainous north. In 1100 AD, the Druze faith (a derivate of Shiite Islam) spread, while other groups of Shiite Muslims settled at the northern and southern fringes of the slopes and in the Bekaa valley. The coastal areas became mainly Sunni. To a large extent, the confessional geography is more or less unchanged.

Evidently, the correlation between confessional and political 'areas of influence' is quite high. This means that the political landscape in the south is dominated by the predominately Shiite communities, such as Hezbollah and Amal, which are both a combination of political parties and Shiite movements, despite the fact that there are some Christian villages in the area.

The interrelationship between Hezbollah, Syria and Iran is complex. It is beyond the scope of this publication to describe it, except for one important aspect: most observers agree that there is a relationship between Syria and Hezbollah. Various factors determine this connection, but in this context the Syrian interest in the 'triangle of headwaters of the Jordan Basin' is significant (see further discussion in *Chapter 4*).

In the late 1960s, Lebanon was drawn into the ongoing conflict between Israel and the Palestinians for various reasons, including cross-border attacks on Israel by Palestinian militia. Internally in Lebanon, and due to the complex political landscape, several factors eventually led to a complex and destructive civil war over 18 years that ended in 1990. In the south, the Phalanges militia fought the Palestinians and Israel supported the so-called South Lebanese Army. In 1978, a UN Peacekeeping Force (UNIFIL) was established upon a request from the Lebanese Government, and still exists today. In June 1982, Israel invaded South Lebanon in an attempt to stop the Palestinian militias' attacks on its northern border.

After May 2000, when Israel withdrew from Lebanon, there was unanimous national support for integration through reconstruction and development of the south.

Still a sensitive *border landscape*

South Lebanon is a remarkable area with long historic ties. In 1999, the Government's High Relief Committee and the United Nations Development Programme (UNDP) described it in the following terms:

> "South Lebanon has been heavily affected by 30 years of conflict. The area possesses important potentials for development; the availability of water; sites of touristic value, resourceful and dynamic inhabitants, and a geographic location that could offer the region a promising future once the conflict is over. What matters today is to preserve this potential and to operate a transition between the politics of emergency assistance and those of development. This would permit, as soon as the conflict ends, an invitation of ambitious projects, including the return of the displaced, as an answer to the reconstruction challenges and in order to consolidate the post-conflict situation with socio-economic progress." (Government's High Relief Committee and UNDP 1999)

This description illustrates the desire of the Lebanese and the international community to develop the area. In the south, around 350,000 people live in precarious economic conditions, with a quarter of households having a monthly income of less than US$300 for an average family of almost five. In addition, social problems exist that are directly related to the post-conflict situation (High Relief Committee and UNDP, 1999).

The border landscape displays marks of conflicts such as minefields, burnt areas and deserted terrain. The region is less developed than the rest of the country, although the Lebanese Government has undertaken efforts to repair and maintain public networks, and launched new projects for Tyre and Nabatiyeh, primarily focusing on water and sanitation.

Photo 13.
Water supply near the border between Israel and Lebanon

From the central government's point of view, it has been important to promote national integration of South Lebanon and ensure an adequate level of services equivalent to that of other regions. According to the government, unless adequate development of the area takes place it may experience multiple negative defects such as:

- "the uncontrolled return of thousands of displaced people to the South, leading to a multiplication of problems related to distribution of water and energy.

Map 10. UN peacekeeping forces in southern Lebanon (Wazzani Springs in red)

- the phenomenon of retaliation and conflict between families and villages can take place and even persist, and
- the water streams might witness irreversible degradation due to uncontrolled movement of reconstruction." (High Relief Committee and UNDP, 1999: 10)

Within such a context, the government emphasized the need to develop the water resources for the people in the Hasbani and the Marjeyoun regions (*cazas*), amounting to about 150,000 people. Such efforts were stepped up after the Israeli withdrawal from the area in 2000.

The *border landscape* in an Israeli context

As described earlier, the strategic water resources are the main concern. However, in this context, the security situation in its northern part is important. The area has been fully developed despite an unstable security situation, and much effort has been put into monitoring and managing the headwaters.

Brief description of the water resource situation

It is quite common in the academic community to compare water availability to a country's population, as an expression of what might be a guiding principle in water allocation between

states. The author takes another perspective, in the sense that a comparison of water availability may be relevant for today's situation and that of the future, pending development of various sectors (especially agriculture), but may not offer principles for solving international water disputes. As in the preceding case of the Golan Heights, as well as with the Euphrates and Tigris Rivers, the relative availability between the states does not determine the respective share, but rather underlines the importance of finding sustainable solutions that could provide a stable and foreseeable water supply for each country.

With this in mind, it is worth noting that Lebanon, on a national level, enjoys a relative surplus of water compared to countries in its proximity. 'Surplus' is, however, a relative concept. This is particularly true as Lebanon, like any other country, aims for socio-economic development that empirically raises demand. The country's own interpretation is that there is a deficit of water resources[5], not least in terms of management of water quality (El-Fadel, Maroun, Semerjian and Harajli, 2003). The only Lebanese international water resource associated with the Upper Jordan River Basin is the Hasbani River, with an average flow of 135-140 MCM per year[6] to which the groundwater is connected.

Lebanon's climate is subtropical, with rainfall between October and April that averages between 600 mm and 1,000 mm yearly at the coast, but may be as much as 1,300 mm in the high altitudes. The Bekaa Valley – from which the Orontes, El-Khabir, and Litani rivers originate – is in the rain-shadow and averages between 350 and 650 mm. The combination of rainfall and snow melting in the spring gives fairly steady flows. Irrigation in the area is necessary, since there are about three to four months with complete aridity. The mountainous geological composition in South Lebanon has little permeability, and because of this water is forced to the surface as springs and small rivers. On the top of the mountains the topsoil is poor, but the lower slopes are intensively irrigated with terraced hills. The coastal area has relative high clay content retaining moisture that produces favourable conditions for agriculture.

The total amount of water is roughly estimated at about 4.5 billion m^3/year. However, due to loss by infiltration and evapotranspiration, the available amount is set at 2.5 billion m^3/year. Of this, surface water constitutes around 2 billion m^3/year, whereas extractable groundwater for the rest represents about 0.5 billion m^3/year (High Relief Committee and UNDP, 1999). The major river, Litani, flows south in the Bekaa valley and then turns westward before reaching the ocean not far from Sidon. In the mid-1960s, an irrigation and hydropower dam at Qir'awn in the Bekaa Valley reduced the flow in lower Litani to 300-400 m^3/year (see Kolars, 1992).[7] In the South, the Water Authority of Jabal Amel (including Bint-Jbeil, Marjeyoun, and Hasbaya *cazas*) manages the water from the following sources: Litani River; Aquifer of Marj El-Khawkh; Sources of Sheeba; Aquifer of Wadi-Jilou; and other sources including Ain-Qenia and Khalawat that feed the same villages of the same names in the *caza* of Hasbaya.[8]

The upper part of the Hasbani Springs is located only 2 km from the Litani River that runs from the Bekaa Valley. The latter is about four times larger than the Hasbani River and used solely within the country.

Development of the water resources in the south has received widespread national support. With the exception of the Hasbani Springs, none of

them are controversial from an international perspective.[9]

The Lebanese Government's justification of the need for about 7 MCM/year (planned to increase to 9 MCM/year) from the springs was primarily related to a "response to a request from the inhabitants to resume the pumping of water to the villages that had been customary before the Israeli occupation. In its time, the latter had deliberately destroyed the Lebanese pipeline and pumps and had deprived the population of the use of the water for drinking, household use or irrigation".[10]

Use of the water for irrigation became a priority as a part of the development efforts in the south (as described above). In 1999, the government estimated the existing irrigated land (in the Hasbaya *caza*) at 300 ha out of almost 6,000 ha (High Relief Committee and UNDP, 1999: 37). In the *Lebanese 2002 Position Paper* to the United Nations, the government estimated that it needed far more than that. It may be necessary to almost double the existing figure depending on the influx of people as well agricultural ambitions. The land capability suitable for irrigation is, however, set at between 5,000[11] and 8,000 ha (High Relief Committee and UNDP, 1999).

Irrespective of the difference, the point here is that the Lebanese Government has a politically-driven development ambition in the south in which development of the water resources will play a central role, particularly due to the impact on poverty reduction and the environment (High Relief Committee and UNDP, 1999: 104).

Lebanon is therefore claiming that it has a need for use of the Hasbani Springs. However, as in the case of any international river, that is not necessarily reconcilable with the downstream country's need for the steady flow of the Hasbani into the vital Upper Jordan River, which in turn feeds into Lake Tiberias.

Israel argues that the Lebanese demand can be met by using water from the Litani River, of which a portion runs into the sea in any case. It is further stated that some of the villages in question used water from the Litani (and through the *Conveyor 800*) prior to 2003.

Both the central and local government in Lebanon are well aware of this sensitivity, not only historically, following the Anglo-French Convention in the 1920s, but also during the Israeli occupation of the south and subsequent events.

The hydro-sensitivity of the *border landscape*

The relative abundance of water in Lebanon compared to Israel, and the Hasbani Springs' proximity to the Israeli border, have fuelled various theories of diversion of the Litani River to Israel. These aspects have been extensively dealt with by several scholars (such as Amery and Wolf, 2000), but despite their rhetorical value, such a diversion seems, in the views of enlightened leaders and experts, unrealistic.

During the Israeli military operations in 1978 and subsequent invasion in 1982, the South Lebanese Army leader Major Sa'ad Haddad became a protégé of Israeli interests. In addition, Major Haddad's militia was reported to have protected the Jordan River's headwaters of the Hasbani by closing some wells and preventing digging of others.[12] Some contest these reports, primarily because, according to Haddad, there were "two taboos – our land and water" (Wolf, 1995: 58). Plans were made by the Israelis to

divert 5-10 m^3/year from the Wazzani Springs for irrigation in Shiite southern Lebanon and Israel (Wolf, 2000: 92). This too was detested by Haddad, but incidents like these illustrate two aspects: (i) the headwaters are not only hydro-strategically significant, but indeed vital for Israel's main freshwater source, Lake Tiberias, and (ii) the springs are geographically located in a sensitive area from an internal Lebanese perspective.

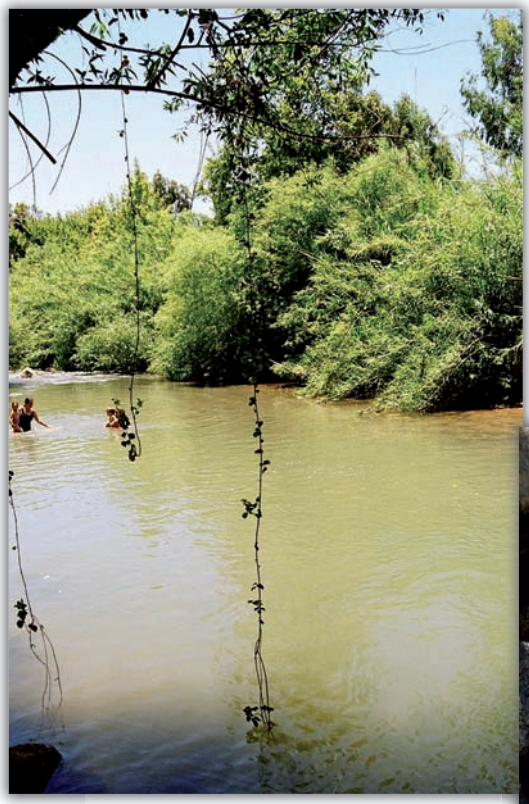


Photo 14.
The Hasbani River in the northern part of Israel

Academic literature has extensively examined the invasion of Israel in 1982 from a hydro-strategic perspective, i.e. on the assumption that the Israeli invasion was primarily due to the wish to secure the headwaters of the basin.[13] In this context, however, this discussion may not yield much benefit, as the two aspects (mentioned above) appear to remain valid. Rather, the question is how to find a solution that is satisfactory for both countries.

Even with this sketchy hydrological and historical glimpse, it seems obvious that the two countries have apparently contradictory interests concerning the management of the Hasbani River.

Photo 15.
One of the small waterfalls of the tributaries to the Hasbani River in northern Israel

Chapter 3

What has been done to solve the dispute?

As in most places in the Middle East, this contested water resource cannot be isolated from other stakeholders and political agendas. One example of such a linkage is that the relationship between Lebanon and Israel cannot be understood without considering the role of Syria (see also Allan, 2002: 254). The interrelationships are complex. However, it seems correct to argue that a peace treaty with Syria is not a necessity for a Lebanese-Israeli water agreement, or at least some sort of 'water understanding'. The Lebanese Government would nonetheless carefully balance its relationship with Syria, the interests of internal political constituencies such as the significant influence in the south of Hezbollah and Amal, and national development efforts.

In contrast to some observers, who set 20 February 2001 as the starting date of the dispute, it seems apparent that a more accurate perspective situates the unsettled management status of the Hasbani River as dating back to 1948. On that date, the local Lebanese authorities began laying a four-inch wide water pipe from the Wazzani Springs to the Wazzani and Maysat villages.

As outlined in the Golan Heights case above, due to the extreme sensitivity in maintaining a predictable and steady flow from the headwaters of the Jordan Upper Basin, Israel immediately reacted through its Minister of Infrastructure, Avigor Liberman. He stated that "nobody heard me say wars break out over water…, but factually that is correct, I regret" (Morris and Smyth, 2001).[14] Similar statements were given by key decision makers during the spring of 2001.[15]

Lebanon responded with letters to the UN General Assembly and Security Council defending and justifying their decision. Israel also submitted a letter to the same consignee on 21 November 2002.

The intensity of the rhetoric ebbed and flowed up until March 2003, when the US-led-coalition attacked Iraq. Prior to this, the EU, US and UN made attempts to solve the conflict. In the fall of 2002, the US dispatched several envoys to the two countries. The EU also sent its EU Rapid Reaction Mechanism with the aim of providing the following outputs:

> "(i) a hydrological impact assessment of the Wazzani pumping station; (ii) an assessment of water needs for the area served by the Wazzani pumping station and a preliminary assessment of the technical options for meeting these needs, and (iii) identification of the parameters affecting the use of water resources in the wider Hasbani

■ Photo 16.
Water pipes at the Wazzani Springs in southern Lebanon

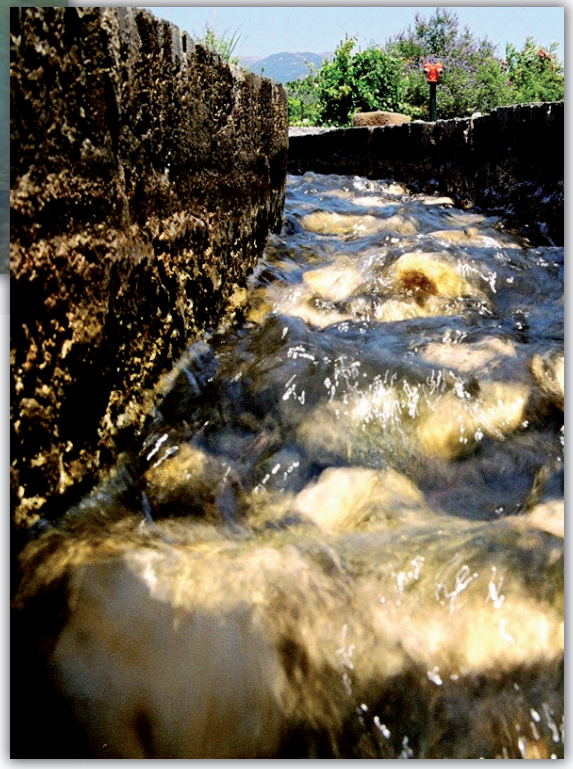
> basin, including their possible impact on downstream water users." (EU Rapid Reaction Mechanism, 2004)

The UN reacted in several ways in 2001 and 2002. It made several offers to the Parties to provide its *Good Office* to the dispute, but was not prepared to mediate between intermediaries (i.e such as through the US or EU).[16] After that, the UN followed the dispute closely, but did not make any diplomatic attempts to mediate.

The dispute was not resolved. Nonetheless, the EU, US and UN, with input from nations such as France and Russia, strongly urged the Parties to solve the dispute peacefully and through talks.[17] Some argued that good winter rains in 2002/2003 "took the edge off the dispute for the time being" (EU Rapid Reaction Mechanism, 2004: 4).

Procedural obstacles in resolving the dispute

The aim of this publication is to propose solutions, an in-depth answer as to why the dispute has not yet been resolved. It seems relevant, however, to clarify that the dispute is both an 'isolated' water dispute over the Wazzani Springs, and at the same time a prelude to how the



■ Photo 17.
One of the small streams that runs into the Hasbani River (Mount Hermon in the background)

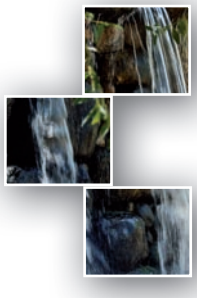
Golan Heights dispute might be solved. The way in which the Wazzani conflict is dealt with may be considered by the Parties to set a precedent for how the Golan dispute will be resolved. Thus, Israel would prefer to have the US as an interlocutor and guarantor in any agreement with Lebanon, while Lebanon (like Syria on the Golan) would want not only the US, but also the UN and possibly the EU.

Therefore, with the danger of simplifying complex Lebanese and Israeli political issues as well as procedural matters, it seems correct to conclude that Lebanon was insisting on using the UN as the interlocutor and guarantor, while Israel wanted the US to play a similar role.

None of the Parties has excluded important actors like the EU, the French or the Russians. However, the procedural stalemate prevailed up to 2005.

However, this creates an opportunity to offer a third party solution that might accommodate both procedural and water management concerns. This part of the publication must be viewed as a desire to use such an opportunity.

The procedural problems should not blur the complexity of how to manage the headwaters of the Upper Jordan Basin. The next chapter attempts to clarify the Parties' positions and real concerns in order to understand how the headwaters may be managed in the future.



Chapter 4

What are the parties' positions and real concerns?

Contentious water resources were not, until Israel withdrew its armed forces from Lebanon, explicitly at the forefront of political rhetoric in either of the countries. In May 2000, after all of the territory in the south of Lebanon came under the sole control of the Government of Lebanon, as the Israeli forces withdrew, according to the UN[II], in compliance with UN Security Council Resolution 42518, major efforts were made to reconstruct and develop the area.

Since then, the Parties have made public statements that appear to be mutually irreconcilable on the as yet unresolved problems of the headwaters of the Upper Jordan River. The positions and interests of the two countries are outlined below, based on an assessment of:

- public oral and written statements by leaders of Lebanon and Israel as well as other international actors such as the UN, the EU, and the US;
- official dossiers from the Parties to the UN General Assembly and the Security Council;
- a Position Paper elaborated by Lebanon (9 October 2002)[III];
- a Conflict Assessment report from the EU;[19]
- international literature on hydrological conditions and chronological escalation of the conflict[20]; and
- the author's familiarity with both Parties' positions and concerns through discussions.

The Parties' positions on the water disputes over the Wazzani Springs are related to:

1. the right to use water with or without an agreement;
2. the amount of water to be used by Lebanon;
3. the need for a bilateral agreement regarding the Hasbani River; and
4. procedural matters.

As illustrated in the preceding disputes, from an academic and historical perspective it is quite interesting to discuss how the disputes evolved and the complicated history of the Parties' relationships. The purpose of this part of the publication is, however, to assess relevant information in relation to a proposed solution. Therefore, the following recapitulation is confined to the relevant history of the Parties' positions and concerns thus far, in order to

As in every dispute, the Parties publicly express their positions. However, it is important to recall that the rarely-stated underlying concerns of the Parties are more relevant for finding solutions.

II According to the 'Blue Line', which was demarked by the UN. Lebanon is still requesting the Sheeba Farms as claimed by Syria in the 1960s.

III Not publicly released.

bring the discussion forward towards mutual conciliations of the different positions.

As in any proposed solution to water disputes in the region, the underlying concerns of the Parties must be addressed (see for example Trondalen, 2004a). It is also recognized that the total sum of the factors is different from the sum of isolated factors. In this context, this means that the two countries may be able to work out an agreement, but it appears that this cannot be isolated from Syria.

As in every dispute, the Parties publicly express their positions. However, it is important to recall that the rarely-stated underlying concerns of the Parties are more relevant for finding solutions (Trondalen, 2004a).

Despite the complexity and gridlocked nature of this dispute, it seems to be solvable to the satisfaction of both Parties. However, the *way* in which this solution is worked out, as described above, is significant. For example, a mediating effort or even a proposal from the US may be viewed differently in Lebanon and Israel to a proposal received from the UN.

Both Parties have stated that they wish to maintain peace and seek a speedy resolution to the dispute through dialogue and negotiation.

This proposal therefore has no political attachments to either of the Parties, nor to any other external stakeholders. Indeed, it is an independent proposal based on *principles of peaceful settlement of disputes* and *sustainable management of water* for the people in the area.[IV]

Both Parties have stated to the UN General Assembly and the Security Council that they wish to *maintain peace*[V] and seek a *speedy resolution to the dispute through dialogue and negotiation*.[VI] Such a mutual political desire further justifies the attempt to develop solutions that could be mutually satisfactory.

Before proposing a possible solution, some of the most relevant positions and real concerns of the Parties must be understood.

The Lebanese and Israeli positions must be seen from a wider hydro-political perspective

International law in itself does not offer a solution to water conflicts, but provides legal elements to guide part of a possible resolution (see Boisson de Chazournes, 2003: 91). The UN framework Convention on the Law of the Non-navigational Uses of International Watercourses of 1997, other similar laws such as the so-called 'Helsinki Rules' (UNECE, 1992) and the associated Protocol on Water and Health (UNECE, 1999) as well as customary laws do not directly offer a solution to the dispute, nor guarantee co-operation.

However, there appear to be a few cases where co-operation has been established and sustained without a legal framework anchored in international law. The legal framework must therefore be carefully weighed by each Party in relation to several factors, such as the following:

- In addition to Lebanon, Israel shares waters with Syria, Jordan and the Palestinian Authority (PA). In some instances, Israel is situated upstream and downstream of the water resource (such as the Gaza Aquifer

IV Along the line of arguments similar to the author's philosophy and approach as described in UN ESCWA (2004).

V Lebanese letter to the UN Security Council of 12 September 2002.

VI Israeli letter to the UN Security Council of 21 November 2002.

and Golan Heights, respectively). The Israeli would therefore probably not subscribe to a rigid upstream or downstream doctrine, but rather advocate balanced principles that serve their interests in a wider regional context. This approach paves the way for reaching a possible 'balanced' solution with Lebanon.

- Lebanon is upstream with Syria and Israel regarding all of the three international watercourses (Nahel el Kabir, Orontes and the Hasbani, respectively). However, as in any international agreements, Lebanon's position on the Hasbani disputes cannot be isolated from the agreements already reached on the Nahel El-Kabir and Orontes Rivers. Neither agreement reflects a rigid doctrinal watersharing position. Rather, they take both Lebanon's and Syria's legitimate concerns into account.

What may at first glance seem to complicate matters is the long and special relationship between Lebanon and Syria. The latter, as a Party to the unresolved water disputes over the Golan Heights and the Euphrates and Tigris Rivers, should therefore be taken into consideration. Although the water basins *are not hydrologically connected*, legal and water management principles advocated by Syria in one of the international water disputes (for example with Turkey and Iraq) will obviously have implications for any other water disputes in which it is involved (such as with Israel on the Golan). Syria may therefore consider the Lebanese/Israeli Wazzani dispute as some sort of a 'prelude' not only of the procedures, but also of water management principles in a possible agreement on Golan.

One may argue that such a connection complicates rather than simplifies opportunities for reaching an agreement on the Wazzani Spring. Another way of considering this is that the dual upstream/downstream concerns of both Israel and Syria open up the possibility for a 'balanced doctrinal' approach.

Some of the *common* concerns expressed by Israel and Syria are outlined below. These arguments (or rather principles) were aired by Israel when dealing with Jordan and the Palestinian Authority (see *Section II* of this publication) as well as by Syria in dealing with Turkey and Iraq regarding the Euphrates and Tigris Rivers (see *Section III*). They include:

- prior consensus with – and notification by – the upstream user, i.e. before the upstream country uses the river;
- non-appreciable harm, meaning in this context that the upstream country cannot use the water without mitigating the pollution and regulating the river without harm to the downstream country (UNECE, 1999);
- in line with the UN Water Framework Convention, both Parties also argue that the riparian states should establish joint mechanisms and commissions in which riparians participate in the regular exchange of information and data, as well as give notification of planned measures;[21]
- similarly, due to their dual up and downstream positions, principles such as equitable usage, reasonable use and no appreciable harm have been aired.

Relevant factors in understanding the Lebanese concerns

One should not infer from this that the Syrian positions will have a direct impact on the Lebanese position in relation to the Wazzani Springs dispute. Nevertheless, due to the geo-political situation in this part of the Middle East, Lebanon's positions cannot be totally isolated from Syria's positions. At least two important aspects are considered below.

First, it is in Lebanon's and Syria's best interests that co-operation over scarce water resources take place – irrespective of their relationship with Israel. The implications of the lack of such an agreement on the Euphrates and the Tigris Rivers are evident for Syria, which over the past 30 years has pressed for a trilateral agreement.

Second, to date Lebanon has not taken a typical upstream position[VII] (cf. the agreements on the *Nahel el Kabir* and *Orontes* rivers). Because of this, it is setting a sound precedent for international water agreements in the region.[22] In fact, Lebanon has underlined the significance of the following aspects (see UN Convention on the Law of the Non-Navigational Use of International Watercourses, 1997):[23]

- "[f]actors relevant to the equitable and reasonable use of water (Art. 5 and 6);
- "[o]bligation not to cause significant harm" (Art. 7);
- "[o]bligations to co-operate and regularly exchange data and information" (Art. 8 and 9);
- "[p]rotection and preservation of ecosystems and the prevention, reduction and control of pollution" (Art. 20, 21 and 23);
- "[m]anagement, regulations and installation" (Art. 24, 25 and 26); and
- "[s]ettlement of disputes" (Art. 33).

Lebanon has therefore, both in reality (by signing the two water agreements with Syria) and in terms of principles (by making agreements with explicit reference to sound and well accepted principles), shown that they are willing to agree on an agreement anchored to the UN Convention.[24]

VII Often called the 'Harmon Doctrine' or the 'Absolute Territorial Sovereignty Doctrine' – a position taken by a country that simply argues that the amount of water originating in their own territory is theirs.

Relevant factors in understanding the Israeli concerns

Likewise, Israel has signed water agreements with Jordan as part of the Peace Treaty of 1994 as well as with the Palestinians in the Israeli-Palestinian *Interim Agreement* of 1995 (cf. *Section II*). In the latter case, however, a 'final' water agreement has not yet been reached.

Despite its polarized political rhetoric on the Wazzani dispute (especially in the period September 2002 to March 2003)[25], Israel has conveyed to the UN that it supports international law as a yardstick and guide on international waters:

- "Customary international law provides that states sharing an international river have a legal right to use its waters".
- "….equitable and reasonable, and that the states are required to take appropriate measures to prevent causing significant harm to other states along the river. In this context, great importance is attached under customary law to existing and historic uses of the river."
- "Equally, a basic obligation of states, according to international law and practice, is to co-operate with all states along the river …".[26]

Israel has not only developed its arguments along commonly accepted international principles, but also conveys that it wants a "speedy resolution to the dispute through dialogue and negotiation".[27]

So, are all these arguments bringing the dispute closer to a resolution? The answer may be that if the Parties' main concerns are reconciled, a solution could be at hand. Currently, the concerns listed below must be addressed – in one way or another – in any agreement:

Lebanon

1. is retaining territorial sovereignty, in this context meaning ownership, control and use of water within its own border;
2. asserting the rights to use the water for the socio-economic development of the area – to date the country has claimed up to 9 MCM yearly;[28]
3. requesting the UN to be an interlocutor and guarantor in one way or another in resolving the dispute; and
4. demanding that the dispute be resolved within an international legally accepted framework.

Israel

1. is objecting to unilateral actions by Lebanon without prior notification and agreement;
2. demanding an agreement that includes water quantity, but equally importantly some kind of assurance that the water quality[29] is kept within certain levels (probably through a monitoring programme);
3. requiring an assurance that unilateral actions will not be taken in the future; and
4. making sure that the UN is not the sole interlocutor and guarantor, but also that the US is involved in one way or another in both capacities.

Syria

To date, the country has not made a direct public statement on its rights to the Hasbani River. As noted in the introduction, however, Syria considers that it will be a riparian when the dispute over the Golan Heights is resolved, and the author assumes that the Hasbani River might be part of the arrangement between Syria and Israel as proposed in *Part 1* of this section.[30] Syria is therefore not included below in the proposed solution to the dispute between Lebanon and Israel, as it would be dealt with under that arrangement.

Although many observers underline the sole importance of maintaining a steady flow of the headwaters of the Upper Jordan River to Lake Tiberias, the exact amount of water is not the crux of the matter for Israel. Rather, how the sharing of water is arranged and guaranteed is crucial. In this context, however, Lebanon is more concerned about obtaining acceptance of its *territorial integrity* and thereby the right to use its 'own' water for socio-economic purposes.[31] From an outsider's perspective, the Parties are two sovereign states that have legitimate and real concerns that must be addressed to mutual satisfaction. Any uneven or unfavourable solution will be unsustainable. This situation is the crux of the matter.

The Parties' concerns in this dispute bear a striking resemblance to those in the water dispute over the Golan Heights. This situation is open to many different kinds of solutions. Although it is not exactly the same as the situation on the Golan Heights, some of the same principles can be applied. The next chapter presents one possible means, among many, of solving the conflict.

Chapter 5

Proposed solutions to the water dispute

As outlined in the introductory part of this publication, the author argues that it is not up to the external community to accept any solution on behalf of Lebanon and Israel. Rather, it should attempt to offer answers to a legitimate question: What kind of yardsticks for a successful agreement can stand the test of historic judgment from people of both countries?

This proposal consists of two elements:

- an allocation/sharing formula; and
- an incremental way of developing the approach.

Development of an allocation/ sharing formula

There appear to be no simple answers such as a specific allocation figure (e.g. a water flow of X m^3/year). However, as mentioned above, both Parties have accepted that they have *rights* and *obligations* to:

- practise sound environmental management for the benefit of coming generations; and equally importantly to:
- provide their citizens with fundamental and universal basic human needs such as water for the socio-economic development of their nations.[32]

If those *rights* and *obligations* are in one way or another met through a third party proposal, this might offer an opportunity for a solution that balances the Parties' concerns. This proposal may therefore not play into the flux and reflux of today's politics, but rather attempt to offer a sustainable solution as to how Lebanon and Israel's *rights* and *obligations* could be met.

As also thoroughly discussed in *Section II*, it is argued that the concept of *sovereignty*, which is closely linked to that of 'rights', might be an appropriate term to translate in a negotiation arrangement. According to international law, the notion of *sovereignty* over any natural resource comprises two important legal principles:

- sovereign *rights*, i.e. 'rights' to water in terms of one of the attributes mentioned above; and
- sovereign *obligations*, i.e. 'obligations' to use the water in a certain way, such as sustainable use, environmental protection and economic efficiency (see national and international obligations as discussed in the introductory part of this book).[33]

Rights: One may argue that any water solution between the Parties should include an

interpretation of the three attributes of 'water rights', such as:

- ownership of a *de facto* portion of the river; i.e. proprietary rights of the economic value[VIII];
- control of the river, especially related to protection of the water quality[IX]; and
- use of a portion of the river.[X]

Obligation: Another interpretation of *sovereignty* is obligation. Every state with *rights* over specific water resources is *obliged* to manage them according to national laws[34], but also according to internationally recognized obligations.[35] Protecting an international river from depletion both in terms of quantity and quality is one of the most important obligations of any riparian Party.

The politically tempting concept of water 'rights' is therefore a double-edged sword for any upstream user, since the notion of obligations is equally strong. This reality is acknowledged by both Parties, and the questions would rather be:

1. How can an agreement between them grant Lebanon its legitimate ownership of a portion of the river and provide Israel with an essential portion to Lake Tiberias in an agreeable manner?
2. How can Lebanon control depletion, especially in terms of protecting the river and the groundwater?
3. How can the Parties agree on a *formula* that regulates usage?

VIII In this context, means a "...property right entitling the owner of the economic value to the water" (cf. Fisher *et al.*, 2002.) The dispute over water ownership is therefore translated into a dispute over the right to monetary compensation for the water involved.

IX In this context, means a "mandate to protect the river system", which would also include "study, monitor, and survey" separately and/or jointly according to a set of water management rules.

X In this context, means a "mandate to utilize/extract/pump for consumption and/or storage".

Proposed application of the Parties' water rights and obligations

In any approach, experience from any other international water agreements must be based on certain agreed criteria or so-called parameters.[36] In this case, a step-by-step approach could be based on a *formula* that specifies each Party's *rights* and *obligations* according to specific parameters, some of which are outlined below.

A *step-by-step approach* is proposed based on an agreed *formula*. Any agreement is probably also

The following parameters could be included in developing mutually satisfactory formulas:

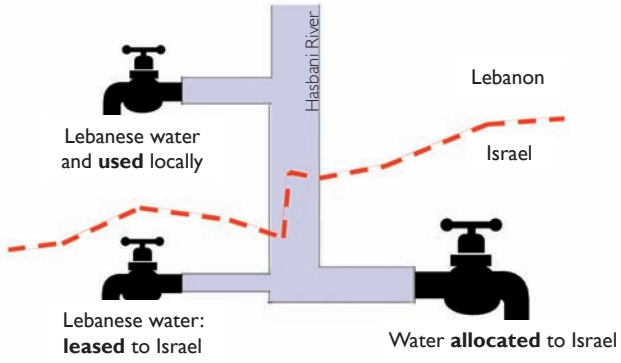
Proprietary rights of economic value (right to monetary compensation for the water involved)

Control ('protect the river systems' also includes 'monitor' and 'survey') separately and/or jointly (in this context, means a mandate to protect the river according to a set of water management rules).

Allocation/share for use (utilize/extract/pump for consumption and/or storage) (expressed in MCM) from the river might be determined in relation to:

a) the need for development and reconstruction locally in Lebanon, and expressed need;
b) the amount of water to be leased to Israel, or in a form which is mutually agreed, to be based on principles for leasing permits, which could also include some sort of compensation mechanism;
c) water balance management: use of the shared/allocated water according to an agreed formula in relation to a sustainable yield (based on a set of hydro-geological/climatic parameters from the past 6-12 months).

Figure 5. An *allocation/sharing formula* for the Hasbani River based on three categories



dependent on the provision in the *approach*. As an illustration of how such a formula may look, see *Figure 5*.

The outlined formula may appear quite complex. This is due to the complexity of the hydrology, with two quite different countries being involved and an intricate water management history (such as different investment in infrastructure and degree of water consumption to economic development).

In this particular context, three important parameters in the formula are:

- proprietary rights of the economic value;
- control; and
- allocation/share of the Hasbani River.

This distinction is made because the Lebanese and Israeli *proprietary rights* to and *control* over the water may be different from the *usage* of the water. The Parties should have equal rights to control the water (as defined), although the usage will be different.

Another important feature in the formula is the difference between the allocated/shared amount of water and actual usage. Due to the need to achieve a rightful and equitable deal between

An example of an allocation/sharing formula of the Hasbani River

Proprietary rights (of the economic value)
Total: 135 M m³ (MCM) (100%)

	Lebanon	**Israel**
• Hasbani river	10%	90%

Allocation/share for use ("Utilize/extract/pump for consumption and/or storage")
Total: 135 MCM (100%)

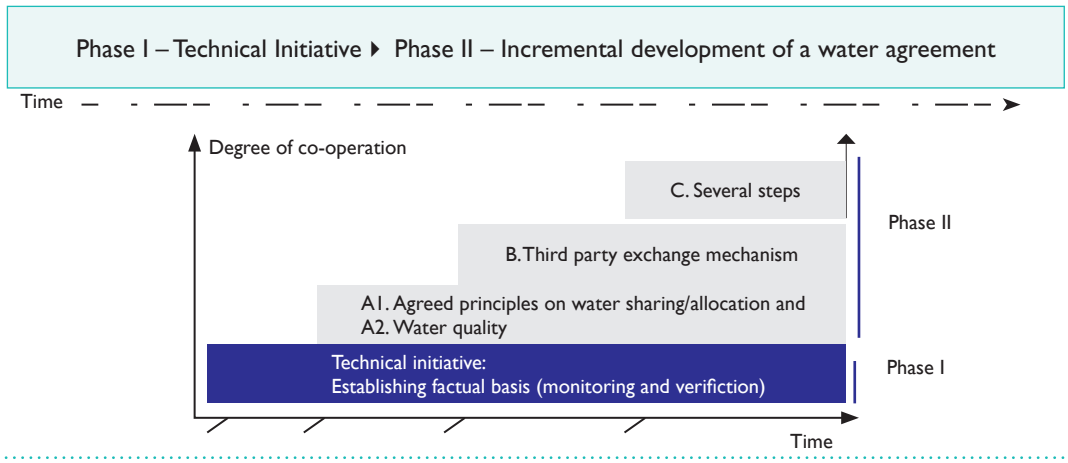
	Lebanon	**Israel**
• Hasbani river	10% (13.5 MCM)	90% (121.5 MCM)

Time period:	**Immediately**	**25-y. lease**	**Immediately**	**25-y. lease**
• Water usage	5% (7 MCM)	7% (9.5 MCM)	95% (128 MCM)	93% (125.5 MCM)
• Leased water to Israel	5% (7 MCM)	3% (4 MCM)		

Control: "Reciprocal responsibility to protect the river systems" (also include "monitor, and survey").

Note: Syria's rights, allocation/share, and control of the river are tentatively being dealt with under the Golan Heights Arrangement.

Figure 6. An incremental approach



them, Lebanon may be granted, for example, 10 per cent of annual discharge as its *proprietary right*. If Lebanon uses this amount now, there would be severe and immediate negative implications for the flow of the Upper Jordan River to Lake Tiberias. Since that constitutes the backbone of Israeli freshwater supply, Israel may lease a certain amount of water (of that 10 per cent) from Lebanon rather than making new and additional supplies (for example through expensive desalination). In the figure below, it is suggested that Israel *lease* 5 per cent of annual discharge, but reduce that amount to 3 per cent over the lease period. Such leases could be negotiated on a regular basis, such as every 25 years.

An incremental step-by-step approach

Recognizing that politics and the history of the Parties' relationship cannot be isolated from any proposal, a step-by-step approach should be designed around a more technical water agreement in order to create a framework that gives both Parties a sense of trust and accountability. Such an approach may consist of following two incremental steps (see also *Figure 6*):

Phase I – Technical initiative

A Third Party[XI] should directly or indirectly conduct a technical fact-finding mission that aims to provide factual matters that are undisputed by both Parties. Answers should be given to the following questions regarding the Hasbani River as it crosses the border:

- What are the annual and seasonal variations of water [quantity] volumes?
- What is the average and what are the variations of the current water quality parameters?[XII]
- Are there any differences in recorded historic data from Lebanon and Israel?
- What changes of the groundwater influence the Wazzani Springs?[XIII]

XI Probably neither the US nor the UN unilaterally, at this stage, but either with both or by another Party that would be (tacitly) accepted by both.

XII Such water monitoring has unilaterally been conducted by Israel (see for example Salingar, Geifman and Aronwick, 1993).

XIII These questions are especially relevant due to the global climate changes.

In order to answer these questions, a monitoring and verification system could be established where the Hasbani River crosses the border; for example in the form of a water quantity and quality monitoring station on each side of the (Lebanese–Israeli) border, in addition to stations for the groundwater. These *technical and bilateral initiatives* should at one stage be *translated into some sort of institutional mechanism* that would function as a 'bridge' to the next phase. The management of these stations could offer such an opportunity.

Photo 18.
A water quality monitoring station in the Middle East

At this stage, the monitoring stations may be managed by the respective national experts together with an independent support and supervision committee consisting of, for example, delegates from the quartet (e.g. the UN and the US) executed by a small technical secretariat provided by one or two 'concerned' nation or nations (for example from countries involved in water issues in the Middle East such as Switzerland, Norway, France, Japan or Germany).

Phase II – Incremental development towards a water agreement

Either as *Phase I* evolves, or at the same time, the Parties could enter into direct or indirect deliberations with an aim of establishing a bilateral water agreement that may contain the following steps:

- A1) *Agreed principles for a sustainable, reasonable, and equitable use of the Hasbani River, including:*
  - extraction volumes (in Lebanon according to agreed parameters such as last year's rainfall); which may also be determined in relation to
  - principles for "leasing water quota [volumes]"[XIV]
- A2) Agreed water quality standards at the border point.
- B) Establishment of a third party exchange mechanism that would handle the leased water, maintain a certain water quality and improve water efficiency according to the set standards (see an example of such a mechanism in the textbox).[37]
- C) *Several steps* are expected to be included in the agreement:
  - identified institutional and political entity(ies) accountable for the agreement from each Party;
  - agreed duration of the agreement in terms of years, such as the duration before re-negotiating the terms of the [so-called] leasing period, for example 25 years;

XIV As in any international river context, one may expect that the demand of those upstream, i.e. the Lebanese, is higher than what those downstream, i.e. Israel, expect to obtain. One option is to grant the Lebanese their proprietary rights, but for Israel to lease a certain amount of water (possibly connected to an exchange mechanism – see textbox). Such 'water wheeling' would give Lebanon the opportunity to lease parts of the water amount and use the funds for socio-economic development.

Third party exchange mechanism (TPEM)

As a basis for a water agreement, the parties have, together with the quartet, agreed to establish a TPEM that will enable Lebanon and Israel to use the Hasbani River while preventing pollution and depletion in accordance with further agreed-upon specifications. A certain amount of water will be leased to Israel.

The funds from the lease are earmarked for projects in Lebanon that aim to increase the water efficiency and treatment according to the set standards; such as:

- financing water-efficient technology and infrastructure;
- financing use of environmentally sound technology; and
- financing water substitution technology.

Independent Support and Supervision Committee

The TPEM could technically and financially be administrated by [a joint (GEF) Secretariat under the auspices of the] 'Extended Quartet' (e.g. France, US, UN, Russia and the EU).

- agreed procedures and milestones and a 'performance review process' involving the Independent Support and Supervision Committee;
- agreed measures in case of breach of agreements between the Parties and a dispute settlement mechanism; and
- the exact mandate and the duration of the Independent Support and Supervision Committee as a guarantor of implementation according to specific criteria (including the financial commitments).[xv]

...both would probably consider the economic cost to be low when compared to the long-term political and economic benefits of peace and higher stability in the region.

How would Lebanon and Israel perceive such a proposal?

First of all, this proposal aims to address the main concerns of the Parties in accordance with their rights and obligations. There may be other factors outside the hydro-political framework that could determine quite a different outcome, or even a continued gridlocked situation.

As in every real-life situation, there are different ways of looking at such a proposal. Most likely, both countries will favour a simple but fair arrangement related to the water conflict. Indeed, Lebanon has done this recently in bilateral agreements with Syria on Nahel el Kabir and the Orontes River and even proposed a step similar to that outlined in Phase I.[38] In the same way, Israel's dossier to the UN goes along the line proposed, and past agreements with Jordan and preliminary ones with the Palestinian Authority follow the principles of need for a factually-based water agreement.[39]

What about the costs of implementation?

This question was asked in all of the preceding water disputes. Again, there are strong reasons to believe that external stakeholders would view these cost estimates as 'recoverable' as compared to the costs of potentially continued instability. As in the preceding cases, any extra-regional benefactors take a self-interest perspective and calculate the economic cost in relation to the foreign and economic interests of their

xv Including questions relating to the role of a larger international constituency in financing implementation of the agreement.

country. For example, historically, the French have a different perspective on the Levant than that of the US or Russia. However, both would probably consider the *economic cost* to be low when compared to the long-term *political and economic benefits* of peace and higher stability in the region.

Such a 'settlement dividend' therefore seems to be high enough for international actors to commit funds to such a mechanism. Moreover, it appears quite evident that multilateral institutions such as the joint United Nations/World Bank Global Environmental Facility (GEF)[XVI] would also be relevant for such a function. An important question would be whether the international community as a whole can afford to see this conflict go unresolved; there is an international moral obligation that transcends politics.

Constituencies inside – and indeed outside – each country may well put different weights on the benefits of an agreement. However, the bigger question is, as always: do the Parties want an agreement and, if so, what kind of price are they willing to pay?

The Wazzani dispute does not determine the political climate; rather, the political climate generates the dispute. In any case, legitimate solutions are there to be agreed upon.

Concluding remarks

As in the case of the preceding and interconnected dispute, the Golan Heights, Lebanon and Israel have *much to lose and much to win* by resolving the conflict over the Hasbani River. There is, however, one complicating factor, namely the interests of Syria in both cases. However it is also an opportunity in the sense that when there is general willingness to negotiate solutions, Syria would be in both nexuses.

This book attempts to present one way of handling both water files based on the same principles, and by taking the Parties' concerns into account while at the same time ensuring that water is sustainably managed.

Despite the ebb and flow of local and geo-politics, managing these precious water resources will continue in one way or another. As time goes by, the urgency for some sort of water agreement increases, making sustainable and realistic solutions even more relevant.

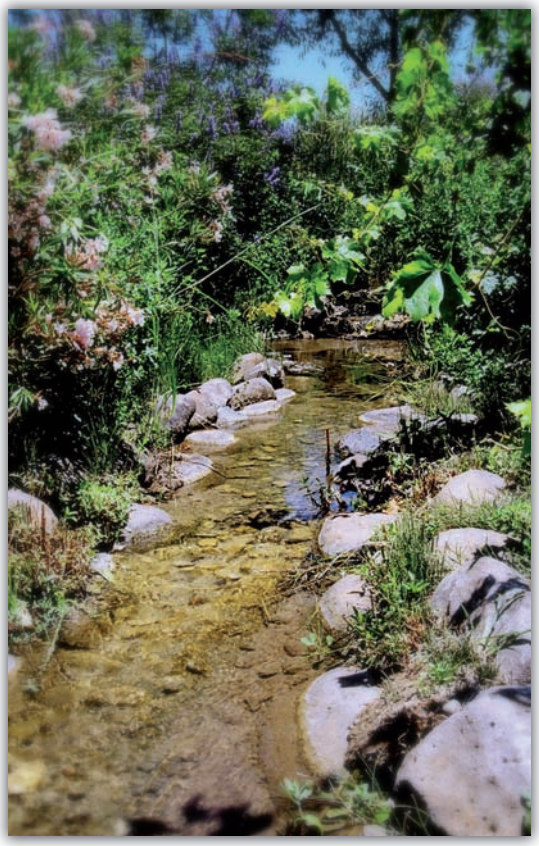


Photo 19.
Small stream in a pristine environment in the Upper Jordan Basin

XVI www.gefweb.org

Endnotes

1 It is obvious that Syria considers that it is a riparian to the Hasbani river. Cf. the former Advisor to the Syrian Minister of Irrigation, Eng. Majed Dawood's statement, "Hasbani… runs for 3 km as an international boundary between Syria and Lebanon", "the river … can only be fairly and sufficiently shared by Syria and Lebanon under international laws after release of South Lebanon and the Syrian Golan under Security Council Resolutions 242, 338, and 425", in Dawood (1995). However, if the boundary is drawn so that the 'Sheeba Farms' become Lebanese, Syria will not border the Hasbani River.

2 There are a variety of sources for these statements. See for example Gvirtzman (2002).

3 See, for example, the study of a twenty-year time series of the water quality in the Upper Jordan Watershed Basin by Salingar *et al.* (1993).

4 For one of the most comprehensive overviews of the sensitivities of the water of Lebanon both from a Lebanese and Israeli point of view by Amery (2000).

5 Deficit may be interpreted as not sufficient to reach the objectives of the government. In this case, Lebanon's five-year water master plan has clearly identified a water demand short of existing and available water resources. Cf. General Directorate of Energy and Water (2001).

6 Almost all publications quote this figure (such as Salingar *et al.*, 1993). However, recently Israeli officials are stating (personal communication) that the annual average flow has been reduced to 105-110 m^3/s. See also Amery (2000).

7 At a national level in Lebanon, there are uncertainties about the water quality, particularly since there is no database. UNICEF estimates that about 60-70 per cent of the resources are contaminated in one way or another. The major pollutants of surface water are untreated municipal wastewater discharge, industrial effluents, improper solid waste disposal and runoff from irrigation. The drinking water networks are quite old and are in urgent need of rehabilitation since almost 50 per cent of the water is unaccounted for. See also METAP (2001) (http:/www.metap.org.files/water%20reports/country/%20Rreport/LebanonWaterQualityReport%20Report.pdf).

8 Data based on government figures as presented in High Relief Committee and UNDP (1999: 32-36).

9 According to senior Lebanese officials.

10 Cf. the Lebanese Letter to the UN General Assembly and the Security Council on 23 March 2001 and on 12 September 2002, and respectively stating:
- "on 20 February 2001 the competent Lebanese authorities began to lay a pipe from the Wazzani spring in order to supply water to the villages of Wazzani and Maysat in response to a request from the inhabitants to resume the pumping of water to the villages that had been customary before the Israeli occupation. In its time, the latter had deliberately destroyed the Lebanese pipeline and pumps and had deprived the population of the use of the water for drinking, household use or irrigation", and in
- 12 September 2002: "The quantity of water of which Lebanon has been availing itself since liberation is estimated at approximately 7 million cubic metres yearly. …At present the Lebanese authorities are laying pipes to ensure the supply of water to the villages in the basin of the Hasbani and Wazzani rivers. The maximum quantity to be pumped will be 9 million cubic metres yearly, which is far below Lebanon's legitimate entitlement." Available at: http://domino.un.org/unispal.nsf/9a798adbf322aff38525617b006d88d7/3ceb1a678c9f17b285256c39004f03b7!OpenDocument&Highlight=2,A%2F57%2F404

11 General estimates by Lebanese professionals.

12 Naff and Matson (1984: 49).

13 With reference to several Arabic, Jewish and external scholars, Amery and Wolf (2000) discuss various perspectives.

14 Morris and Smyth in *Financial Times,* 16 March 2001. See also Anders Omberg Hansen's extensive analysis over the chronological evolution of the dispute, especially from 2001 to 2005 (Omberg Hansen, 2004).

15 Such as PM's Advisor Ra'anan Gissin (*Financial Times,* 16 March 2002) and General (Ret.) Uri Saguy (BBC News 15 March 2001). PM Sharon was reported by BBC News on 10 September 2002 to have said on Israeli Army Radio that: "...he had notified the United States that Israel could mount military operations should Lebanon begin pumping water out of Hasbani or its tributary, the Wazzani River".

16 Several actors from the UN were involved such as the UN HQ's Department of Political Affairs, the UN Special Envoy to the Middle East, and the UN SG's Special Representative to Southern Lebanon as well as the UN Economic and Social Commission of Western Asia (ESCWA) based in Beirut, whereas the latter submitted a report stating more or less explicitly that Lebanon had full rights to utilize the water.

17 Cf. According to *Jordan Times,* 15 September 2002, the Russian Foreign Minister called on both Parties to "solve the problems peacefully, through talks".

18 UN Security Council Resolution 425: Mideast situation/Lebanon – establishment of UNIFIL – Security Council Resolution 19 March 1978 (http://domino.un.org/unipal.nsf).

19 Cf. EU Rapid Reaction Mechanism – End of Programme Report – Lebanon/Israel Wazzani springs dispute, January 2004 (http://europa.eu.int/comm/external_relations/cpcm/rrm/wazzani.pdf).

20 In the latter case, see, for example Omberg Hansen (2005).

21 "In determining the manner of such co-operation, watercourse states may consider the establishment of joint mechanisms or commissions, as deemed necessary by them, to facilitate co-operation on relevant measures and procedures in the light of experience gained through co-operation in existing joint mechanisms and commissions in various regions".

22 Cf. Director General Fadi Comair's comprehensive paper on the experience gained from the water agreement with Syria on the Orontes River and the Nahr el Kabir River, "Hydro Diplomacy of Middle Eastern Countries along with the UN Convention on Non-Navigational Uses of International Water Courses: Case Study Orontes & Nahr el Kabir", in: UNESCWA (2004).

23 *Ibid.* (p.13).

24 *Ibid.* Quotes from the agreements such as:
- "Place of a storage dam abides to several conditions": "socially, technically, economically";
- "Allocation based on technical and economic studies" (p.7);
- Flexible formula: "Allocation volume to Lebanon (64 MCM) but only 40 in dry years" (also specified) (p.7);
- "Rightful and rational distribution / benefiting of international riparian rivers" (p.11).
- Formula of using their upstream portion: "IF either Syria or Lebanon wish to use certain amounts of water from the upstream portion of the river within the limits of their parts (60 per cent and 40 per cent respectively), all with respect to the ecological considerations mentioned in Article 5, this amount shall be deducted from their share of stored water. Any country that does not use its entire share of stored water by the end of the hydrological year, according to the schedule of water intake shown in Annex 2 of this Agreement, is not allowed to use this share during the coming year" (p.11).
- Join efforts by building a dam on Nahir El Kabir (p.12).

25 Cf. Anders Omberg Hansen's chronological analysis of the conflict level, 2005.

26 See the Israeli letter to the UN Security Council of 21 November 2002 (p.3).

27 *Ibid.* (p.6).

28 Some high officials in Lebanon argue that their "share" should not be restricted to this figure, that figure was only as a first step in further water development.

29 Due to the extreme hydro-ecological sensitivity of the influx of water to Lake Tiberias (cf. *Part I* on the Golan Heights).

30 As stated earlier, if the boundary is drawn so that the 'Sheeba Farms' become Lebanese, Syria will not border the Hasbani River.

31 This does not mean that Lebanon is not concerned regarding water quality. See for example two of the publications from the Lebanese Ministry of Environment (1996) and "Decision 8/1 related to standards for wastewater discharges", 2001.

32 Cf. the introductory part of this book with reference to Israel's and Lebanon's signatories to relevant international conventions ("Some reference points in discussion of water disputes in the Middle East").

33 There is a vast international literature on state sovereignty, and an example of one such discussion is outlined in Tignino (2003) and her references to the literature, especially on "new sovereignty" (list of references in footnote 81, p. 390).

34 For Israel, the Water Laws (5719-1957), amended in 1991, and for the Palestinian Authority, the Water Law enacted 3/2002.

35 See, for example, the European Union's *Water Framework Directive* as one of the most comprehensive and strict pieces of legislation in terms of obligations put on each member country concerning water protection and sound management (cf. http://europa.eu.int/comm/environment/water/water-framework/index_en.html).

36 *The International Water Dispute Data Base* at Department of Geography, University of Oregon.

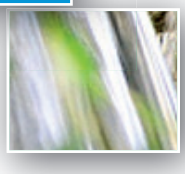
37 The need for such measures are also described in World Bank (2001a).

38 Lebanon has in fact advocated this. The Lebanese President for example invited the EU "... to provide technical assistance to establish objective baseline information on the water resources of the disputed area" in the EU Rapid Reaction Mechanism's Report (2004: 2). See also official statements such as those of the Lebanese Director General (Directorate for Energy and Water) in UNESCWA (2004: 16):

- "adaptable management structure incorporating a certain level of flexibility allowing for public input, changing basin priorities and new information and monitoring technologies";
- "clear and flexible criteria for water allocation and quality: allocations, which are at the heart of most water disputes, are a function of water quantity and quality as well as political fiat";
- "effective institutions must at least identify clear mechanisms for water allocation and water quality standards that simultaneously provide for extreme hydrological events, new understanding of basis dynamics and changing societal values";
- and statements related to "distribution of benefits", "protection of the environment ecosystem of the basin as a whole".

39 Israeli letter to the UN Security Council, 21 November 2002.

SECTION II



Contested water between the Israelis and the Palestinians

Abstract

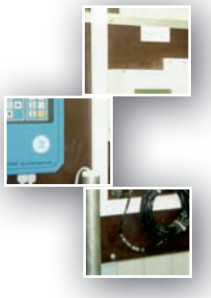
As in the case of the water disputes discussed previously, this part of the book does not prescribe a quick-fix solution to a complex dispute. Indeed, the Israeli–Palestinian relationship is intertwined with local and international politics and the contentions over *water* are embedded in the ongoing political drama. The intention, however, is to make a contribution to the ongoing debate and negotiations between the Parties and other stakeholders in order to remove one of the obstacles for a sustainable peace.

This publication does not attempt to quote the many Palestinian–Israeli water experts, but rather distil some of their ideas in such a way that certain elements are filtered out as a basis for a possible solution to the disputed water.

There is therefore no presentation of 'new' information nor of a 'one-text proposal', but rather a reflection of various ways of thinking by suggesting specific steps to be taken.

Some of the key questions relate to how to co-operate, and along which timeline. The proposal outlines an incremental step approach whereby each gatepost implies fulfilment of mutual rights and obligations in combination with the establishment of a comprehensive performance review process. In short, water rights are interpreted in various ways based on a formula detailing an allocation/sharing regime.

The two main concerns – managing the water resources in a sound manner while taking the interest of the Parties into account – are incorporated in such a way that the precious water may create an opportunity for peace.



Chapter 1

Water as a contender for peace

As we have seen above, water disputes are complex and hard to solve. The *Palestinians* and the *Israelis* are also caught in an entrenched water conflict in the Middle East. This one is quite different from the three others due to the complex intertwining of the two people geographically, historically, politically, religiously and, not least, emotionally.

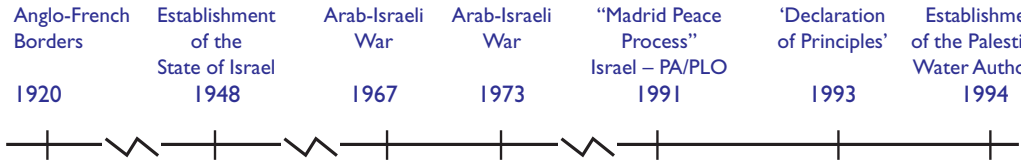
The dispute in the same land can be traced back to Biblical times, during the era of the Patriarchs in Palestine, as described in Genesis (21:25, 30-32). According to this religious text, Abraham went to King Abimelech for a permit to use a well, which he obtained. A generation later, like his father, Isaac went to King Abimelech, and despite political differences, made proper arrangements and was granted continued use of the water (Genesis 26:18-23, 26-32).

Today, the conflict over water is similar to those described above. Yet while it is an obstacle to peace, it may possibly provide the conditions for making peace.

Connecting the past and the present

Obviously, knowledge of the past is important to understanding the current situation. In this setting, however, only a few points on the timeline will be highlighted. The present water dispute cannot be viewed without considering the evolution of the Arab–Israeli relationship. This includes historic ties between the Palestinians, Jordanians and Israelis, including the pre-1948 period, the establishment of the State of Israel in 1948, and its socio-economic evolution. It further includes the challenges of the Palestinian communities since 1949 and 1967, including the Palestinian refugees, and subsequently the establishment of the Palestinian Authority in 1993. The latter event led to the setting up of Palestinian public institutions, including the Palestinian Water Authority (PWA), which was formally announced in April 1994.

Map 11. Israel and the West Bank and Gaza



A sketchy timeline with some relevant miletones

Emphasis is placed on a brief overview of the nature of the dispute and the Parties' concerns. Some of the international and bilateral responses to these problems are also briefly described. Finally, a proposal on how to consider moving foward is outlined in *Chapter 4*.

As in the case of the preceding water disputes, one should be cautious in prescribing quick-fix solutions for such complex matters – especially when they involve the ongoing political drama of the Israeli-Palestinian conflict. The proposed approach should therefore be interpreted as *one of several ways out of the problem*. The intention, however, is to make a contribution to the ongoing debate and negotiations between the Parties and other stakeholders in order to remove one of the obstacles for peace.

Israeli and Palestinian water experts are not only internationally renowned for their general competence on water issues, but even more so for their specific knowledge of the nature of the water problems and remedies in their region. This publication does not attempt to recite all of them, but rather distils what some of their leading experts have propounded. It will not be a repetition, but will rather filter through possible approaches that may encapsulate some of the Parties' real concerns through a non-partisan perspective.

What also makes this dispute different to the others is that since the 1993/1994 period, the Parties have worked more closely together and more or less *clarified the factual basis* for deliberations on water issues.

This section of the book is therefore different from the others, since there is no presentation of 'new' information nor of a 'one-text proposal'. Rather, it reflects various ways of thinking by suggesting specific steps to be taken.

Such an endeavour could easily become an academic exercise. Instead, however, it attempts to propose solutions as a result of scholarly perspectives combined with discussions with relevant actors from each of the Parties, thus without their official approval.

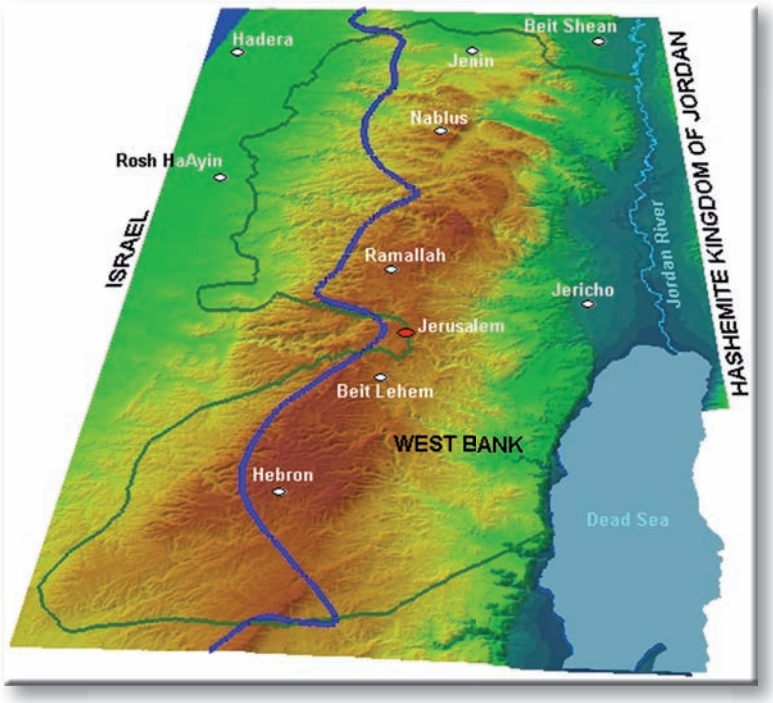
Nonetheless, one should not hide the fact that constituencies exist within each Party that strongly argue for *unilateral* approaches and believe that any co-operation with the other would endanger its own course. The author understands the arguments and acknowledges the risks involved. However, the 'Siamese twin' relationship between them, due to the sharing of vital aquifers, requires at least some form of basic co-operation. The key questions are how to co-operate, and along which timeline. The latter point is highly uncertain due to the unpredictability of political events in the region, but some steps may exist that can already be taken at this stage, or at least seriously considered by the Parties, before their common water resources dwindle to an extent that may

threaten the humanitarian situation and stability of both societies.

Human suffering due to inadequate water facilities, especially among Palestinian communities, has already reached a level that by all international standards is unacceptable. This in itself justifies the proposal outlined in the following pages.

Before turning to a discussion of various models of co-operation and a proposed approach, a brief geographical description of the water resources are outlined in the next chapter.

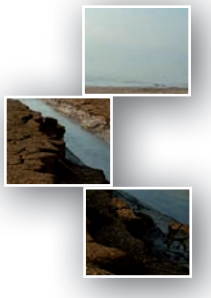
Map 12. Illustration of the West Bank with the Mountain Aquifer divide



Blue line: *the divide between the Western and Eastern Aquifers. Ground water flow directions are west and east, respectively.*

Green line: *the Green Line (1967 borders).*

Note: The extension of the Western and Eastern Aquifers as well as the replenishment areas are not shown here. The boundaries of the Western Aquifer are complex – in some areas they are west of the coastal line and in some cases east. There are also sections below the Coastal Aquifer. In the Eastern Aquifer, the Jordan River delineates its eastern boundary (Gvirtzman, 2002).



Chapter 2

The water resource situation and what has been done to solve the problems

Water is a scarce resource in Israel as well as on the West Bank and Gaza Strip, hereafter also named 'areas under the Palestinian Authority (PA)'. The area[I] is situated in an arid zone with low and high variability of rainfall. The water resources are beyond any doubt insufficient to supply the needs of the people today. In fact, both peoples are facing a looming water shortage of critical proportions.

Historically, water management in the area remained more or less unchanged for centuries, until the building of the Israeli State in the 1950s. The aspirations of the Israeli founders were quite clear. In the aftermath of the First World War, controls of vital water resources were high on the political agenda. When the two European allies, Britain and France, entered into detailed negotiations to draw the borders, water was at the forefront (Fromkin, 2001). As described in *Section I*, the Upper Jordan River was of vital importance due to the securing of the headwaters for Lake Tiberias[1], and the so-called Mountain Aquifer amounted to approximately 30 per cent of freshwater supply to the Israeli and 70 per cent to the Palestinian population on the West Bank (see an illustration of the horizontal east-west water divide of the Mountain Aquifer in *Figure 7*).

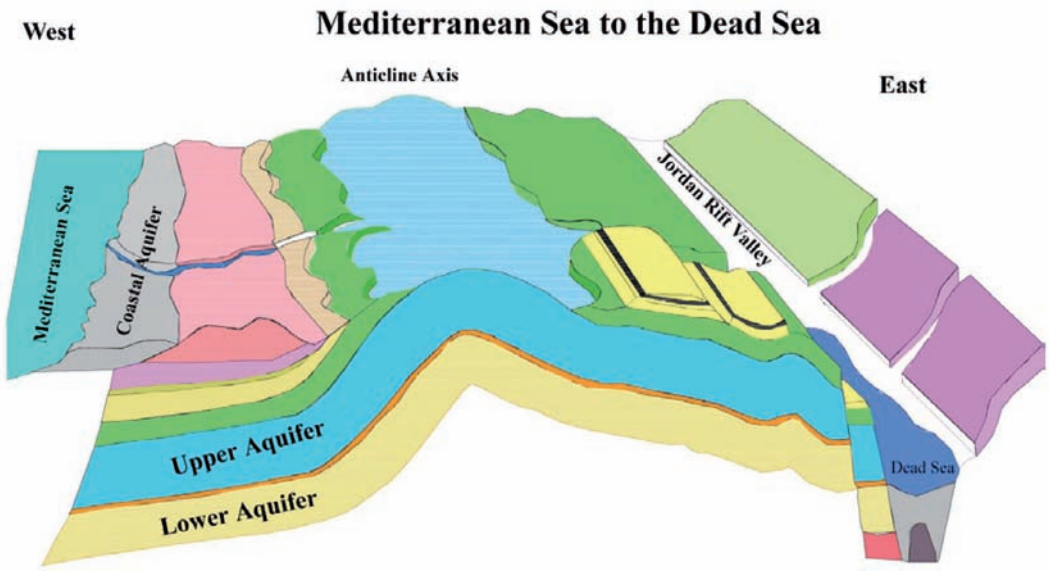
Some reservations in describing disputed water resources

Both Parties have different ways of describing the status and physical locations of the resources, as this could potentially strengthen or weaken their respective arguments. It appears evident that the Palestinians would focus on the following parameters:

- historic use of the water resources – such as the wells and springs on the West Bank and Gaza Strip, as well as the Jordan River;
- which resources are recharging from which areas and who has the control of which parts of the hydrological systems, including recycled water;
- which Party uses how much per capita and from which resource or recycled water – especially a comparison of per capita consumption of water by the Israelis versus the Palestinians;
- who has *de facto* control of which resources and recycled water;
- the use of water in Israeli settlements on the West Bank compared to other Palestinian towns and villages;

I In this context, the 'area' means the territories of the internationally recognized State of Israel, the West Bank (irrespective of the exact location of the Green line (pre-June 1967 line) and Gaza Strip. The exact borders and territories are not defined more precisely at this stage.

Figure 7. Hydro-geological west-east cross-section through Jerusalem of the West Bank/Judea



Source: Guttman, 2004.

- the possible implications of the Israeli National Water Carrier on the local climate; and finally
- the 'strategic' location of the Israeli wells on the Green Line of the West Bank (see for example Kawash, 2004; PWA, 2004a).

On the other side, Israel would highlight:

- the net benefit to Palestinians of the meticulous management of the scarce resources, especially management of recycled water and protection against pollution and overpumping since 1967;
- provision of water supply and building up of water infrastructure during the time when the West Bank and Gaza Strip were under complete Israeli military administration – especially with regard to the water carrier system;
- supply of water to the Palestinian communities despite the recent hostilities;
- the benefits of long-time monitoring and study of the various hydrological systems as a basis for management control; and
- explanation of the difference in water consumption between the two peoples due to a higher socio-economic level in Israel than among the Palestinians.[2]

The different way of describing the water resources certainly makes even hydrological presentation quite a politically sensitive matter. Despite the danger of being viewed as biased, some relevant parameters have been selected below as a background for proposing a possible approach to solving the dispute.

Some general trends in the water resources for the area

Both Parties agree that water resources are deteriorating – some of them slowly and others

more rapidly. This is primarily due to the following driving factors:

- population growth plus an increase in the standard of living and thus demand for more water;
- global climate change;
- deterioration of the water quality (pollution); and
- decrease in natural recharge to groundwater aquifers as a result of increased urbanization.

Map 13. Intertwined Palestinian and Israeli water infrastructure on the West Bank

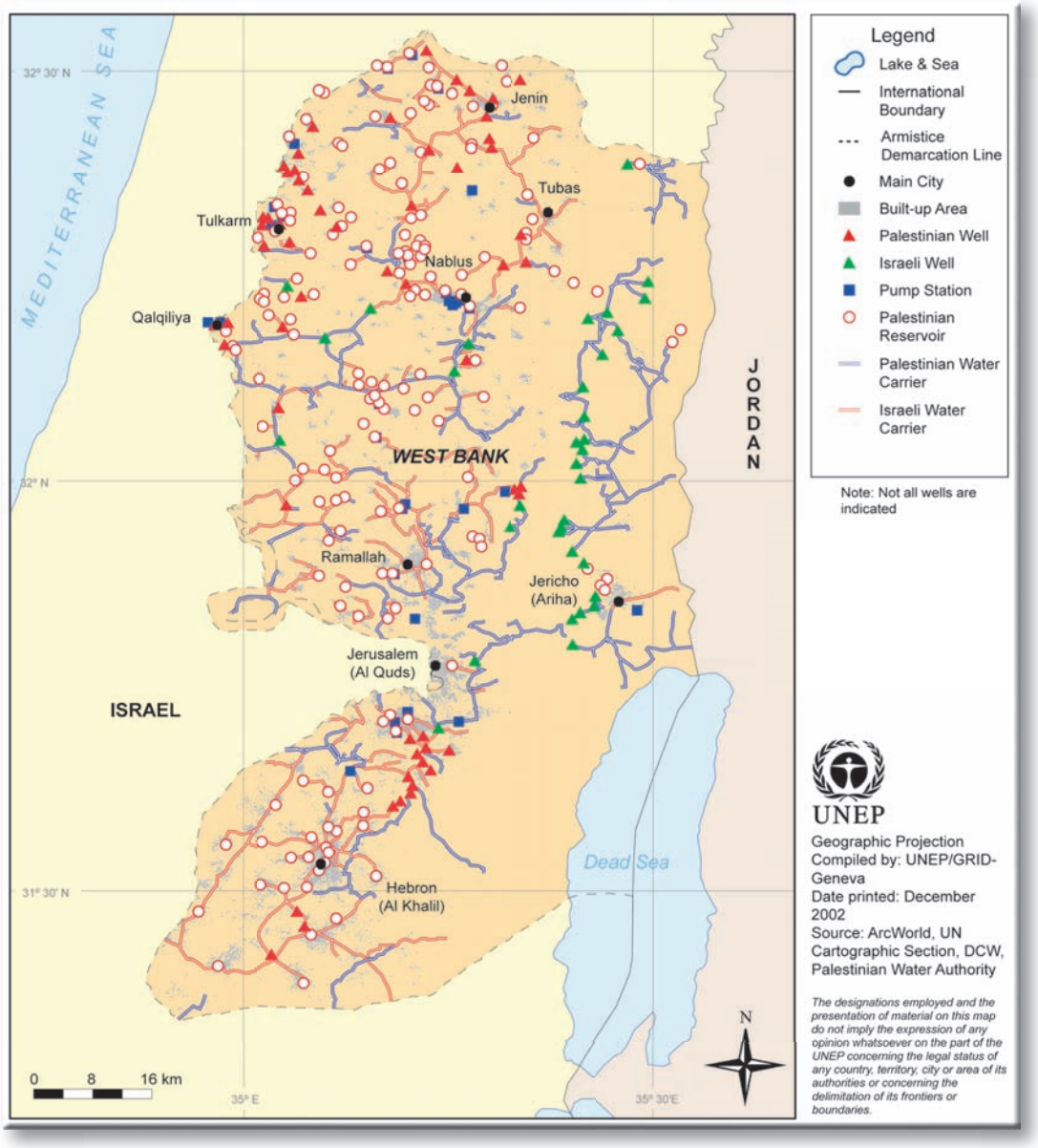
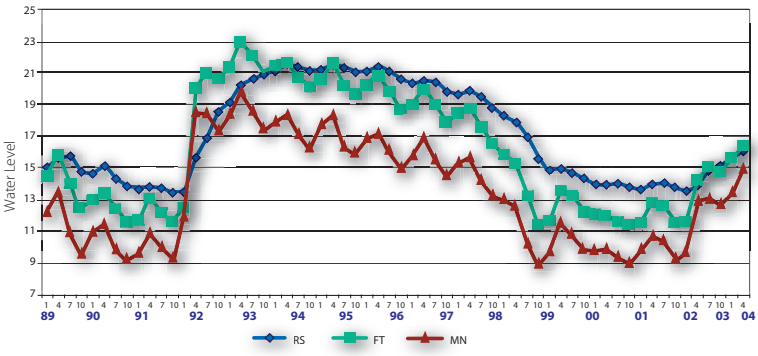


Figure 8. Changes in the water level of the Mountain Aquifer, 1990-2004



Source: Guttman, 2004.
Note: The well BS represents the southern part, the well PT represents the central part and the well MN represents the northern part of the mountain aquifer system.

At present, and in contrast to the disputes related to the Euphrates and the Tigris Rivers, there is little controversy over the water data.

Furthermore, the conclusions are irrevocable: the aquifers must be managed very carefully. If they are not, the sustainable yields and storage capacity may be reduced to the detriment of further generations of Israelis and Palestinians alike. The Mountain Aquifer system is often classified into the following aquifers: the Western, the North-Eastern and the Eastern. However, recent research shows that the demarcations between them are not so clear (see Gvirtzman, 2002; Shuval, 1992).[5]

In the near future, none of the abovementioned trends are likely to change. On the contrary, the two Parties will face:

- probable successive drought years;
- continued exploitation of natural resources, causing their depletion;
- delays in the introduction of desalination; and
- delays in adjustment of demand and water prices to the desalination age.[3]

In addition, it is also understood that fulfilment of the obligation to supply water, as required by international agreements, from Israel to the PWA and to Jordan, will further reduce the current existing amount of water.[4]

Description of the Mountain Aquifer system

There is a vast amount of Israeli, Palestinian and international literature regarding the nature of water resources in the area. What is relevant in this context, however, is a brief description of the disputed water resources, including their geographical location.

The hydro-geology is such that the aquifers drain west and eastward along a watershed as indicated in *Figure 7*. It is obvious that since the drainage patterns of all the aquifers involve areas from both Parties, some form of co-operation or at least co-ordination is necessary. The recharge of the complex hydro-geological systems is less than what is extracted.

The water level has significantly decreased over the past 15 years (1990-2004), as expressed in *Figure 8*. There are several reasons why the levels have varied, such as recharge, pumping and management of outside water resources.[6]

Since both Israelis and Palestinians are pumping from the same water resources, it is obvious that – at least up to now – most of the water

infrastructure has been intertwined, as illustrated by *Map 13*. The resources are 'shared' between the two Parties. They will have to co-ordinate and co-operate even more in the future, since the stress on the resources for the West Bank and Gaza will increase.

Another contested resource is the Jordan River running from Lake Tiberias and down to the Dead Sea. The Palestinians are demanding that the river be included in the upcoming negotiations.[7] This will be quite a complex matter due to the sensitivity of Lake Tiberias as the main water supply for Israel, further complicated by the fact that many of the salty sources naturally draining towards the lake are diverted into the Jordan River after the outlet from the lake.

The salt content of the river is therefore very high even before it reaches the Dead Sea. In addition, Jordan has also *de facto* excluded the Palestinians as a riparian, through signing the bilateral Peace Treaty between Israel and Jordan in 1994.

Since this has been tabled by the Palestinians, however, it would have to be addressed in the upcoming bilateral talks.

Brief description of water resources in the Gaza Strip

The water situation on the Gaza Strip is undoubtedly in a very grave situation. Due to overexploitation and despite both international efforts to identify the problems and mitigating efforts (such as recharging and water treatment measures), the aquifer systems are extremely exposed to irreversible damage.

There is general consensus among national and international water-professionals (Vengosh *et al.*, 2005) that the PWA's official statements are not an exaggeration, as illustrated below:

"1. The demand greatly exceeds water supply.
2. More than 70% of the aquifer is brackish or saline water, which leaves no more that 25% of the aquifers suitable for drinking purposes.
3. Gaza water resources need to be protected from pollution since they are subject to severe contamination caused by wastewater and agricultural activities.
4. New water resources need to be added to the aquifer system in order to minimize the water deficit and to improve the groundwater in terms of quantity and quality."[8]

Total groundwater abstraction is estimated at 140-145 MCM/year divided into:

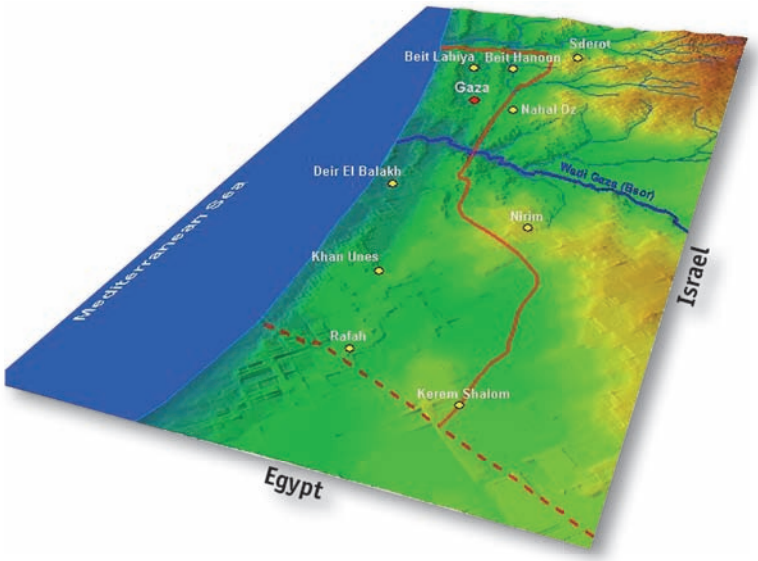
- agricultural, 85 MCM/year – from 3,800 wells,
- municipal, 54 MCM/year – from about 100 wells,
- Israeli settlement-related, 5-7 MCM/year – from about 40 wells.

The PWA further states that the extent to which the aquifer may be impacted by other pollutants such as organic chemicals, metals and pesticides has not yet been fully defined. Pollutants can reach the shallow water table quickly. Sixty per cent of reported diseases in the Gaza Strip are water-related.

The current gap between supply[II] and demand[III] of water on the Gaza Strip is calculated at 55 MCM/year (in 2003, see PWA, 2004b).[9] This figure is confirmed by a comprehensive study under the auspices of the German Technical Co-operation

II Rainfall and 'sustainable' groundwater yield.
III Actual consumption.

Map 14. The Gaza Strip (with the Wadi Gaza) under the Palestinian Authority



Comparison of supply and demand of water for Israel

It has long been acknowledged that the gap between supply and demand, even if theoretically no water is shared with and allocated to the Palestinians, is rapidly increasing, and that new and additional water resources must be provided now if human suffering for the impoverished part of the population is to be avoided. The Israelis are aware of this situation, as various public awareness campaigns have been carried out for decades.

Today, investment in the water sector as well as its economic significance is illustrated by the fact that the Israeli water company Mekorot is one of Israel's 15 largest companies, with an annual turnover of approximately US$500 million.

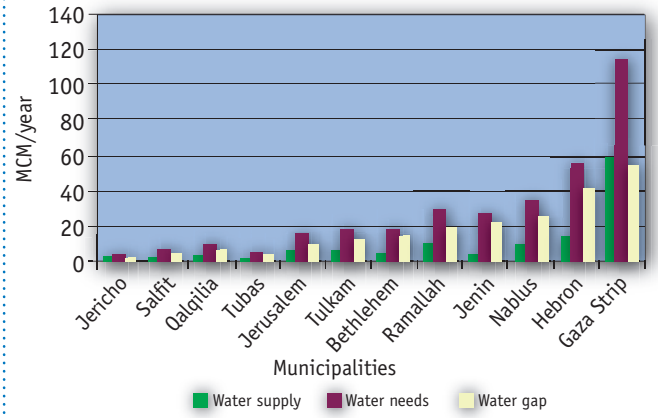
Water consumption in Israel in 2003 was estimated as outlined in *Table 4*, with 1,862 million cubic

(GTZ, 1998). The GTZ study estimates that there will be an investment need for high priority projects[IV] in Gaza alone amounting to at least US$734 million (GTZ, 1998: Table 2.2 (Evaluation Report)). These figures are staggering.

Comparison of demand and supply of water for the Palestinians on the West Bank and Gaza Strip

For obvious reasons, the existing water resources are simply not sufficient to satisfy the demands of both people. As of today, the situation is as expressed in *Figure 9* for Palestinians on the West Bank and Gaza.

Figure 9. Current Palestinian municipal water supply needs and gap (in 2003)



IV Such as conventional water resources, demand management, treated wastewater reuse, brackish water desalination, freshwater supplies and treated wastewater supplies.

Table 4. Water consumption in Israel in 2003 (in MCM)

Use	Rigid consumption	Potable water consumption	Entire water consumption
Residential	689	689	689
Neighbours	96	96	96
Industry	90	90	122
Agriculture	-	497	955
Total	875	1,372	1,862
1991	527	1,453	1,762

Source: Mekorot, 2004.

metres (MCM) being consumed per year. The renewable water resources are considered to be 1,750-1,800 MCM.

Additionally, lack of water for the agricultural sector would have negative socio-economic implications. Many countries have adopted a high degree of self-sufficiency in food production, especially if there is a risk of embargoes during tense geo-political situations. Israel is no exception; in fact, agricultural production is used as a domestic incentive in settling the population of the whole of Israel, including in the Negev desert. Despite the fact that water for the agricultural sector is decreasing and efficiency (output per unit of water) increasing, there seems to be no doubt among Israeli water experts and international observers that in the future the agricultural sector will not receive the amount of water it receives today.

Israel participated in the international GTZ Study (under the Multilateral Peace Process), not to obtain a better overview of its own state of 'water affairs', but rather to obtain increased international legitimacy regarding a major shortfall of water. Years ago, Israeli experts predicted today's situation. GTZ estimates that demand will rise from past use (in 1994) of 1,904 MCM/year to 2,135 MCM/year in 2010 (see *Table 5*).

Such projected demands are quite staggering if these scenarios actually eventuate. There is no doubt that the gap will increase, but Israel has the knowhow and skills to handle this (Oren, 2004). Shortage of financial means, however, will probably be one of the main obstacles. The cost of transferring economic sectors from high water demand to non-consumptive sectors will place a burden on the consumer that will not make such transitions without complications.

Table 5. Current water use and future demand

Core party areas	Current use (MCM/a)	Low demand scenario (MCM/a)			Base demand scenario (MCM/a)			High demand scenario (MCM/a)			Sustainable demand scenario (MCM/a)		
Year	1994	2000	2010	2040	2000	2010	2040	2000	2010	2040	2000	2010	2040
Israel	1904	2005	2052	2428	2039	2135	3766	2057	2387	4066	1787	1881	2300

Source: GTZ, 1998.

Photo 20.
Desalination of brackish water is one part of the solution for both Parties

What can be done to fill the gap between supply and demand of water for the Israelis and the Palestinians?

In brief, there seem to be three ways of filling this gap:

- use existing water resources more efficiently with a variety of measures, such as a higher degree of recycling, improved technology and demand management such as application of policy instruments (e.g. incentives for saving such as pricing);
- new and additional water resources, such as desalination of brackish water as well as sea water, import of water by land[V], and import of water using sea transport[VI]; and
- substitution of the water by restructuring the agricultural sector for both the Israelis and the Palestinians, meaning that water use for domestic food production is substituted with importation of food (i.e. the notion of 'virtual waters') (Allan, 2002).

Both Parties have acknowledged that unless co-ordinated efforts are taken to protect the most exposed water resources, they will simply be destroyed.

From a professional point of view, various means of filling this gap must be initiated, and some of them have already been put in place, such as a 50 MCM/year desalination plant in Israel. For both Parties, rising to the challenge of filling this gap is imperative for further development of both communities – and at the least will be granting people a basic need. Nevertheless, the Parties must handle the question of 'division' of the water resources on the West Bank and the Gaza strip, irrespective of how the gap is filled. The question of whether or not they should co-operate on filling the gap may be handled regardless of the attempt to solve the water dispute.

The author therefore assumes that the Parties will co-operate on one or more of the ways of filling the gap. However, the extent of such co-operation will probably not influence how the existing water resources (including recycled water) are 'divided'. This leads to a more specific discussion on the sensitive nature of the areas and resources in question, particularly in relation to protection of and sovereignty over existing resources.

Sensitive water resource areas on the West Bank and Gaza

Both Parties have acknowledged that unless co-ordinated efforts are taken to protect the most exposed water resources, they will simply be destroyed. The grave situation is further substantiated by the United Nations' comprehensive study on the environmental situation of the West Bank and Gaza Strip (UNEP, 2003a). The PA, through its water authority and relevant ministries, must develop plans to handle the urgent water challenges (MOPIC, 1998).

V Although politically not feasible, according to GTZ, 1998; from other river basins in the areas including Turkey.

VI Such as surplus water from Turkey (Manavgat River on the Mediterranean coast).

Israel has decades of experience in meticulous surveying and monitoring of the water resources, including on the West Bank and Gaza Strip. Through institutional, legislative, financial and scientific means, the management aspects are handled carefully – probably one of the most well-developed practices worldwide.[10]

Unilateral management of water resources by the Parties is complex in itself. Co-operation represents an additional complication, since several technical and political problems must be handled together, both prior to and during co-operation. There seems to be no doubt that neither of the Parties have any illusions that the water can be divided and managed in complete isolation.[11]

This drives the water management situation into what is, at times, an involuntary co-operation. The challenges are enormous, but not insurmountable as long as there is a willingness from the Parties to co-operate and from the international community to assist their endeavours. Some of the challenges are outlined below.

Water as a territorial and sovereignty challenge

Water resources are considered by both Parties to be an integral part of territorial sovereignty (see further discussion of the concept in *Chapter 3* of this section). It is argued here that sovereignty and water are issues that must be tackled in conjunction with other factors, and not just from a strict 'what-is-on-this-side-of-the-border issue'. Sovereignty is a legal term, but also a highly political and emotive one, which can be deconstructed into 'domestic' or 'internal sovereignty', whereas the relationships between States or State-like entities are characterized as 'external sovereignty' (cf. Green Cross International, 2004: 44).

As a separate and internationally-recognized state, Israel's interpretation of sovereignty means full ownership and unrestricted access and control of the natural resources. However, even seen in isolation to its neighbouring states, any unilateral approach to management of international watercourses infringes on each Party's strict interpretation of territorial sovereignty. There is therefore a question as to whether the vague notion of sovereignty is the one that brings forward various models of co-operative action.

The question of sovereignty and borders[VII]

Many scholars and politicians argue along at least two lines: First, the inseparability of national sovereign rights of territory and resources, often named 'territorial integrity'. The proponents argue, more or less, that any water resources within their borders are theirs. The second, more pragmatic, view is that insistence on the inseparability of the sovereignty/border nexus is not bringing negotiations on disputed resources any further. As the coming chapters reveal, there are other ways of looking at sovereignty over one's 'own' water resources. Prior to this, however, a brief outline is provided of what has been carried out to date to solve these problems.

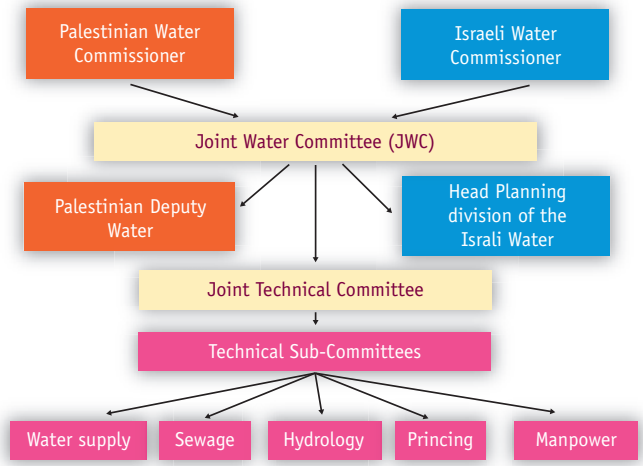
What has been done to date?

Academically, the history of the development of the relationship between the two Parties is quite interesting. An in-depth analysis of this might offer more insight into the past, but not necessarily into the future. There are, however, a few events that are important to bear in mind.

VII Already in the aftermath of the First World War, controls of vital water resources were high on the political agenda. When the two European allies, Britain and France, entered into detailed negotiations to draw the frontiers, water was at the forefront (see Fromkin, 2001).

First, from 1948 to 1967, the Palestinians managed their water under Jordanian auspices and through a quasi-institutional and legislative setup (CESAR, 1996). It was after 1967 and the Israeli annexation of the West Bank and Gaza that water management in the areas changed.

Figure 10. Organigram of the joint Palestinian-Israeli arrangements



Source: Keidar and Kawash, 2004.

According to Israeli law, the West Bank and Gaza Strip were under Israeli Military Administration, meaning that the Israeli Government was obliged to provide the Palestinian citizens and society with adequate water. From 1967 onwards, Israeli settlements (up to 175,000 Israelis) were established on the West Bank and Gaza Strip.[VIII] The Israeli water carrier system (cf. Shoam and Sarig, 1995), to which Palestinian towns and villages connected, was increasingly built upon.

Management of water resources on the West Bank and Gaza Strip formally changed its nature in September 1993. A 'Declaration of Principles' became the first bilateral agreement between the Palestinians (formally the PLO) and Israelis. It was agreed that water issues should be discussed in a forum called the Permanent Palestinian Israeli Committee for Economic Co-operation.

The Gaza–Jericho First Agreement, signed on 4 May 1994, was a temporary arrangement that *de facto* established the PA. According to this agreement, a limited authority on water uses was transferred to the PA, which then received control over the water resources and related infrastructure in the West Bank (WB) and the Gaza Strip (the two areas) as well as over operation and management of the water systems.[12]

In 1995, the Interim Agreement (known as the 'Oslo II agreement') between the two Parties outlined temporary means of co-operation (article 40). These included measures to protect existing resources and produce new and additional ones, as well as sharing/allocation of water resources according to the following formula (see Annex II):

- Both Parties agreed that there was a future need of 70-80 MCM/year on the West Bank, and 28.6 MCM/year was made available by Israel to the PA as an immediate and interim measure – including 5 MCM/year to the Gaza Strip.
- The additional amount (41.4-51.4 MCM/year) should be developed by the PA from the

VIII The Israeli settlements on the Gaza Strip were abandoned under the Prime Minister Sharon government during the summer of 2005.

Eastern Aquifer and other agreed sources in the West Bank.

Since the signing of the Interim Agreement of 1995, they have worked together through a Joint Water Commission (JWC) and Joint Supervision and Enforcement Teams (JSET) as illustrated in *Figure 10*. Both have realized that co-operation has been essential for what has been achieved. Even during the turbulence of the Palestinian *Al-Asqua Intifadia*, the JWC met on a regular basis and agreed that the water infrastructure was of such importance that it should remain 'untouched' during hostilities.

The expectations of the results of the JWC might differ, and the Palestinians have conveyed a desire that the mandate cover additional areas (such as including *Areas C*).[13]

In addition, and since 1995, quite a few bilateral initiatives with the PA, especially from Germany, Japan, Canada and Norway have taken place. They have also been supported by a more structured multilateral engagement.

Multilateral initiatives

In 1991, the Madrid Process was established as an attempt primarily by the United States and Russia to solve the gridlocked crisis in the Middle East. The focus on the talks included five of the core Parties: Syria; Lebanon; Israel; and the Palestinian and Jordanian representatives, which formed one delegation until September 1993 and then became two separate ones.

Five working groups were formed. They included: Regional Economic Development; Arms Control and Regional Security; Refugees; the Environment; and the Working Group on Water Resources (WGWR). This latter is chaired by the US, with Japan and the European Union serving as co-organizers. It has been divided into several initiatives, with the active participation of extra-regional parties like France, Canada, Germany, Oman, Tunisia, Luxembourg, Norway and, more recently, Switzerland.

Since the first regional conferences (in Madrid, Washington DC, and Moscow) between 1991 and 1993, only three of the five core Parties participated, namely Jordan, the PA and Israel. They addressed four areas to cope with some of the critical water issues[14]:

- enhancement of water data availability[15];
- water management practices, including conservation;
- enhancement of water supply; and
- concepts of regional water management and co-operation.

Since its inception, the WGWR has implemented several initiatives whereby each project enjoys the support, both technical and financial, of one or more of the WGWR's extra-regional donor delegations.

Quite a few observers argue that the multilateral framework has been a successful mechanism for addressing regional problems, not least in an Israeli-Palestinian context. The WGWR, in particular, is still successfully developing a cadre of high-level water decision-makers that work effectively together on regional water issues.

Others might argue that despite the fact that the WGWR projects continue to provide important benefits to participating regional parties, water allocation and water rights between the Palestinians and the Israelis have not been addressed. Such an argument might bear merit if the Parties had expectations of using the multilateral forums for such decisions. The fact is, however, that the three core Parties have jointly

decided to co-operate on initiatives that are complementary to bilateral negotiations, such as in the case of the Jordanian–Israeli peace treaty of 1994, and the Interim Agreement between Israel and the PA in 1995.[16]

One of the fruits of the WGWR was the signing of the first trilateral water agreement between the Parties in 1996, the so-called Declaration of Principles on New and Additional Water Resources (Trolldalen [Trondalen], 1997). As an explicit reflection of the Parties' desires, no reference to allocation or interpretation of water rights was included. It did, however, provide some very important concepts for regional co-operation that might be highly applicable in the near future – if the Parties continue their co-operation. More importantly, and with relevance for the outlined proposal (in *Chapter 4*), is the fact that it reflected the level of mutual confidence at that time.

Regional initiatives on desalination of brackish water and seawater as a means of augmenting the nation's water supply have already been undertaken by the Gulf States for many years, as well as recently by Israel on a larger scale (by building and planning plants with a production capacity of about 435 MCM/year in the coming years). Under the WGWR umbrella in 1996, the three core Parties, together with several other countries[17], established a Middle East Desalination Research Centre in Muscat, Oman, paving the way for direct co-operation.

Another regional initiative of relevance to the Israeli–Palestinian relationship is the development of plans for *transferring water from the Red Sea via a hydro-power station down to the Dead Sea* (400 metres below sea-level) as a joint project between Jordan, Israel and the Palestinian Authority; the so-called Red-Dead Canal Project.[18] This project has been stalled for years. Recently, however, the Palestinians have become a partner to the project, which will provide around 870 MCM of freshwater a year to the three partners, as well as around 550 megawatts of electricity a year.[19]

Another alternative considered that would probably involve all three Parties is the Med–Dead Canal Project (by transferring water from the Mediterranean Sea to the Dead Sea either *via* the *Qatif* or the *Amakim* alignments, whereas the latter starts near Haifa or Hadera).

Transportation of water by ships would be yet another alternative, such as for example the agreement signed (in 2004) between Turkey and Israel on transporting water by ship from the Manavgat facility in Turkey to Israel, or other joint or/and national projects.

In any case, the three core Parties agree that regional co-operation is necessary and complements bi- and unilateral approaches.[20] Bilateral disputes and co-operative projects are also expected in the future to be dealt with directly and outside the 'multilaterals'. As *Chapter 3* shows, however, there are international stakeholders that cannot be neglected, either during the negotiations or while securing compliance with future water agreements.

Chapter 3

The Parties' positions and real concerns

As in most contentious situations, the Parties and their allies have, over the years, made public statements that seem to be mutually incompatible on water management. The solutions to the water disputes between them will probably not be found in past rhetoric and entrenched positions. However, they have real concerns that must not be overlooked in any proposed solutions. Unless the Parties – whether the leadership or the public, or preferably both – feel that their concerns and needs have been met in one way or another, past experience shows that the solution will not last long (Trondalen, 2004a).

As in any conflict situation, the perceived gap between the professionals, the political leadership and the public is posing, in this case, a particular challenge. Unfortunately, there is a gap between the political rhetoric and what can feasibly be achieved in a solution to the water disputes. Both Parties must be prepared to compromise and, equally importantly, prepare the public for the fact that not all national aspirations can be maximized. There are reasons why this has not been done, and it appears that it is not only due to political decisions, but also to the fact that neither Party wants to be perceived as 'giving in' in the preparatory negotiations.

The challenge of enlightening the public and preparing for a realistic solution may look trivial, but recent events such as the Golan Heights negotiations between Israel and Syria may serve as an example (see *Section I, Part 1*). In this case, public preparation was not carried out to an extent that gave the leaders the necessary 'mandate'. However, as some have argued[21], leaders must sometimes take steps that go beyond the popular public perception. The gap, however, must not be too large.

...leaders must sometimes take steps that go beyond the popular public perception. The gap, however, must not be too large.

With this in mind, the Parties' positions and interests will be described while bearing in mind that any sustainable solutions can only be found by reconciling their concerns rather than their positions.

As outlined in the following text, the Parties are approaching the water dispute from two quite different perspectives. Despite the striking moot points, it is recognized that the water crisis is severe and that both Parties have humanitarian

obligations to provide water to the people that go beyond the present rhetoric and points of view. 'Water rights' are, in fact, essential to achieve the "right to a standard of living adequate for the health and well-being of himself and of his family".[IX]

This is the *raison d'être* that makes solutions possible. Before turning to those in *Chapter 4*, the Parties' positions and concerns are outlined.

Palestinian positions and concerns

The Palestinians' positions on the water disputes are related to:

- water rights, including water sharing;
- an agreed-upon formula for water allocation (between the two Parties);
- an exact location of the borders on the West Bank that will also determine control of the water;
- the West Bank Barrier/Separation Wall[X]; and
- control, access and protection of the water resources.

In an academic sense, it should be possible to clearly define the Palestinian positions. In real life, however, these positions are not carved in stone. The Palestinian leadership is well aware that the total sum of the factors is different from the sum of isolated factors. The Final Status negotiations either along the Quartet's Road Map (see further discussion in *Chapter 4*) or with a different formula may well create situations where either Party could be willing to yield on one position if there are some concessions on other issues, or if the overall outcome justifies the compromises.

...there are reasons to believe that the Palestinians will demand water allocation on the basis of geographical and hydrological principles...

The main positions related to water rights, including water sharing

As discussed above, positions are not the same as interests or concerns, but are rather strategic and tactical. As of today, the PA takes the following positions (not necessarily in this order of priority):

- "to secure an Israeli commitment to respect international resolution on sovereignty;
- to exercise its right to permanent legal sovereignty and actual control over water regarding sources that lie within its territory – as in the case of Israel;
- to take whatever measures are needed to use water resources within the boundaries of its territory, including its share of joint aquifers, with commitment to respecting the rights of the other Party and refraining from causing it any damage;
- to have a share of the eastern wadis of the Gaza Strip. Methods for sustainable management of such wadis must be discussed; and
- to have a share of the Jordan River Basin. A comprehensive joint co-operation agreement that includes all other Arab countries riparian in such basis must be made."[22]

An agreed-on formulation of water allocation (between the two Parties)

Although this has not been claimed officially, there are reasons to believe that the Palestinians will demand water allocation on the basis of geographical and hydrological principles (i.e. the degree of contribution to the watershed such as geographical extension and/or rainfall within such parameters) as well as social and economic needs (including industrial and agricultural demands).[23]

IX See the United Nations' Universal Declaration of Human Rights, Article 25.

X A Palestinian term. The Israelis call it a Security Fence.

In addition, the PA states that:

- "any physical, administrative, or legal measures taken by the Israeli authorities relative to Palestinian water resources must not affect Palestinian water rights (to be negotiated);
- the Israeli side must give restitution to the Palestinian side for the losses of the Palestinian people as a result of Israeli measures in the field of water;
- co-operation on the use of shared ground or surface water aquifers cannot be discussed before reaching a clear agreement, according to which the Israeli side acknowledges the Palestinian water rights;
- the temporary agreements set forth in the Oslo agreements do not affect Palestinian water rights, given that those agreements are temporary and interim. The Palestinian people's rights to their water resources are permanent and unquestionable;
- water rights cannot be measured by the average individual's need or by dunums of land. Complete sovereignty over water resources within the boundaries of 'Palestine';
- the Palestinian State must be able to exercise its rights to use the water of the Jordan River Basin and to participate fully in the management of this basin;
- the Parties must review the mechanism for transferring the title of water infrastructure that belongs to the Israeli side and is located within the border of the West Bank and Gaza Strip to the Palestinian side; and
- the Parties must discuss the Palestinian share for the Jordan River Basin and how to benefit from such a share. A comprehensive joint co-operation agreement that includes all other Arab countries riparian in such basis must be made." (UNESCWA, 2004)

Photo 21.
A small stream draining to the Dead Sea

The PA has made a strategic decision to attempt to increase the legitimacy of its arguments by basing its positions on UN resolutions rather than on international law related to international watercourses (PWA, 2004a). A key issue is not whether that is wise or not, but rather that a set of explicit positions have been brought forward to the Israeli.

Location of the Green Line on the West Bank in relation to control of water[XI]

The Israeli decision to build a security fence has raised sharp criticisms from the Palestinian and Arab sides, who call it a 'separation wall'.

This highly contentious issue is further disputed since the route of the barrier is considered to have relevance for control of the water resources by creating 'facts on the ground'. According to the PA, the barrier has the following implications in relation to management of the water resources:

XI The Green Line is the ceasefire line on the West Bank as until 1967. It was normally marked as a green line on Israeli maps.

- "The wall will prevent the Palestinians from utilizing their own water resources in the Western Aquifer Basin."
- "Only a small portion of the Upper Aquifer utilization area in the Basin lies within the fenced-in Palestinian areas."
- Israel will "control 40 Palestinian water wells (…with a pumpage of about 5,23 MCM/year) located in the fertile agricultural land that lies between the Green Line and the wall".
- Furthermore, the PA is particularly concerned that "moving the political border [Green Line] a few hundred met[res] east would mean that G[round] W[ater] utilization areas would be under the control of Israel in the final settlement." (UNESCWA, 2004)

The PA uses the Latrun case (an area along the Green Line located near the highway from Jerusalem to Tel Aviv) as an example of where it is losing 'strategic' land that might be used as a bargaining tool in relation to allocation of the Western Aquifer.

For obvious reasons, their arguments are quite clear and founded on one way of thinking and reasoning. In this context, an interesting question is whether the route of the wall/barrier will have an impact of the permanent status agreement. There is, however, no clear answer to this political question. What seems obvious is that drawing borders in this area has never been insignificant (e.g. the Camp David negotiations in late 2000).[24] The proposed solutions (in *Chapter 4*) would have to take this factor into account, but any border and associated water allocation and sharing are all parts of a larger puzzle. One can hardly argue that a 'temporary'[25] fence would determine intergenerational water rights.

Israeli positions and concerns

Israel is approaching the water dispute with the PA in quite a different way to the Palestinians. Sovereignty over water resources has been at the forefront of the Zionist movement for over 100 years.[26] Systematic water studies and subsequent projects were conducted as early as the 1930s in preparation for the establishment of a Jewish state.

Sovereignty over water resources has been at the forefront of the Zionist movement for over 100 years.

One of the first major efforts by the new state was the development of national water plans and projects, including draining of the Hula Valley (north of Lake Tiberias) and building of the National Water Carrier System, which included transferring water south to the Northern Negev desert.

A turning point took place after the war in 1967, where the Israelis took control of almost all springs and branches of the Jordan River as well as groundwater in the West Bank and Gaza Strip (WBGS). Since that time, major water infrastructure has been developed – primarily in Israel as well as in the WBGS.

Some major overriding Israeli concerns have and still prevail in all water-related matters, as discussed below.

Hydro-strategic concerns

Despite changing governments in Israel, a univocal affirmation of the strategic importance of proper management of water for the very existence of the state has been repeated. At present, the web of economic and social growth is very much determined by use of water. In the Israeli mind,

sound management, or more correctly speaking proper stewardship, of the precious water has led to a situation whereby the country's water management policy and practice is a model for most nations. Conservation methods measured both in terms of efficiency and effectiveness are considered to be some of the best in the world. Therefore, protection and conservation of already-existing resources are essential concerns for all Israeli water professionals and managers.

Interestingly enough, the influential National Security Council (NSC) has made several statements on this matter. In 1999[27], the NSC warned of the danger of overpumping the Mountain Aquifer and of developing a joint management arrangement with the Palestinians due to what was considered to be their inability to enforce any agreement that may be reached. It further cautioned that extensive 'wildcat' drilling and over-exploitation would lead to diminution of the quantity and quality of the water in the aquifer.[28]

The professional establishment in Israel, such as the Water Commissioner, is somewhat more nuanced with regards to contentious issues like granting water rights to the Palestinians. The author is not aware of any updated *official* position paper on water regarding the upcoming negotiations. There are, however, quite clear official and expert statements in line with the Interim Agreement from 1995 that warn of the danger of not managing the water resources in a proper manner. There are a few overriding concerns.

A major issue is how to extract the water from the Mountain Aquifer System in a sustainable manner and in terms of sharing with and/or allocation to the Palestinians. Measures to prevent and mitigate pollution are considered to be critical (see Schwartz and Zohar, 1991). The objectives would be to:

- prevent unregulated increase of the extraction of the groundwater at the expense of Israel's water supply; and
- prevent pollution of the aquifer as a result of uncontrolled activities such as untreated flows of sewage and other forms of waste.

It is further argued that principles of prior and present use on the definition of the source according to the location of the springs would be the guide in any negotiations rather than the outcrops of the aquifer. In addition, water should be allocated where there are the highest economic benefits (lowest production costs).

There is a water crisis and a severe water deficit

The political and professional establishment in Israel acknowledges that:

- water resources are scarce, and insufficient to meet present and certainly future needs (Schwartz and Zohar, 1991). This is further underlined by the fact that the water crisis has accumulated a deficit in Israel's renewable water resources amounting to 2 billion m^3 – an amount equal to the annual consumption of the State[29]; and
- drastic adjustment in various sectors (including agriculture) must be taken in order to manage the crisis.

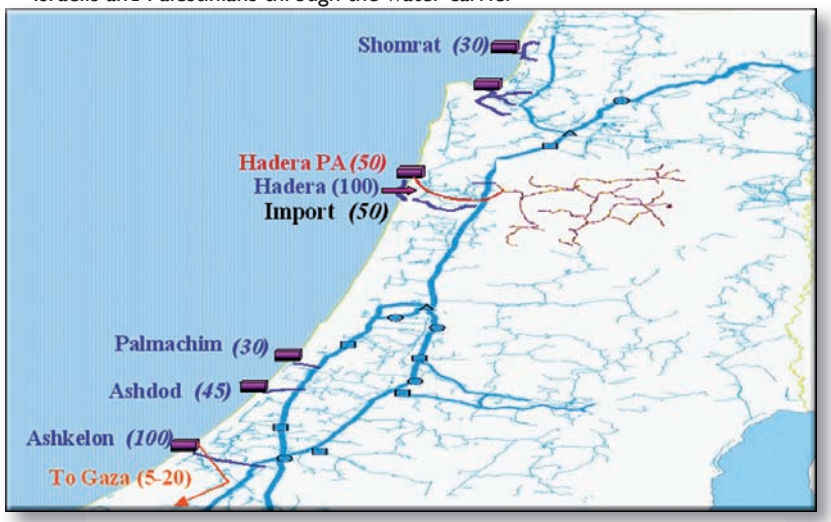
Co-operation on new and additional water resources

Israel is therefore requesting acknowledgement by the Palestinians that the water situation is alarming – including the Mountain Aquifer System and Coastal Aquifer – as well as that the Gaza Aquifer faces a risk of severe pollution. These problems are of paramount importance compared

to the amount of water to be shared.

On *Map 14*, the locations of planned desalination plants are, according to the Israelis, 'ready-made' for linking up to the Palestinian water system so that together they may provide new and additional water.

Map 15. Development of seawater desalination plants that could serve both Israelis and Palestinians through the water carrier



Source: Dreizin, 2004.

Israel further argues that a deficit cannot be shared and that co-operation will be possible on new and additional water resources in order to cope with the existing and future deficit.

The issue of water rights

Israel has already recognized that the Palestinians have water rights on the West Bank (see *the Interim Agreement of 1995, para.1*), and has expressed willingness to discuss the Palestinians' water needs. It is a general international impression that their position has been interpreted as 'rights to use water'. As will be discussed in the following text, translation of the vague political notion of 'water rights' into a concrete water management regime is a major challenge, especially since there is a definite limit of available resources.

Israel is well aware that water rights are a major issue for the PA, and that external observers will probably not know the exact Israeli position before real negotiations commence.

Arguments used by Israel in developing joint management arrangements

There are different views on the extent to which joint management mechanisms should be developed. Some argue that unilateral approaches serve best the interests of the state, based on the following argument: "...the profound difference, not only with regard to the substance of the hydrological interests of Israel and the Palestinians, but also over the very definition of the principles defining the right of ownership of the water adopted by each side, make it difficult to be optimistic as to the prospect of joint management" (Sherman, 2001: Appendix VIII).

This view may contradict the principles established in the Interim Agreement of 1995, which emphasizes joint arrangements not only by the establishment of the Palestinian-Israeli Joint Water Council, but also of the Joint Supervision and Enforcement Teams. Although there are

different views in Israel about these matters, irrespective of ideology there are reasons to believe that the water resources must be managed through national and joint institutional mechanisms.

The fact that two separate political entities exist – one situated upstream and the other downstream – always increases the chances of friction and hence the failure of any joint management endeavour. Such tension may arise not as a result of intentional malevolence, but out of divergent views involving *bona fide* differences of perspective on given objective circumstances (see also Sherman, 2001).

Tension may arise not as a result of intentional malevolence, but out of divergent views involving *bona fide* differences of perspective on given objective circumstances.

What are the individual Parties' perceptions of the other Parties' positions with regards to the water negotiations?

In any assessment of water conflicts, an understanding of the Parties' respective perception of the other Party's positions and concerns is relevant in order to develop any possible solutions (see Trondalen, 2004a).

The Israeli perception of the Palestinian concerns

There are no easily accessible public Israeli statements on the Palestinian positions. However, based on discussions in the area, there are good reasons to argue that the Israelis are very well aware of the PA's positions, such as that:

- the PA is demanding sovereignty over the water resources within the West Bank (and Gaza) without any guarantees of protecting the aquifer against pollution and overpumping[30];
- Palestinians demand that water rights be granted according to international law and codes of conduct, but so far without further specifications, especially in relation to obligations in line with international law[XII], as to when and how such rights would be acquired and which obligations would be accepted; and
- the PA acknowledges that sewage and pollution are a major challenge, but has, as of today, very few feasible plans, institutional or financial means or enforcement mechanisms of any policy that might be developed.

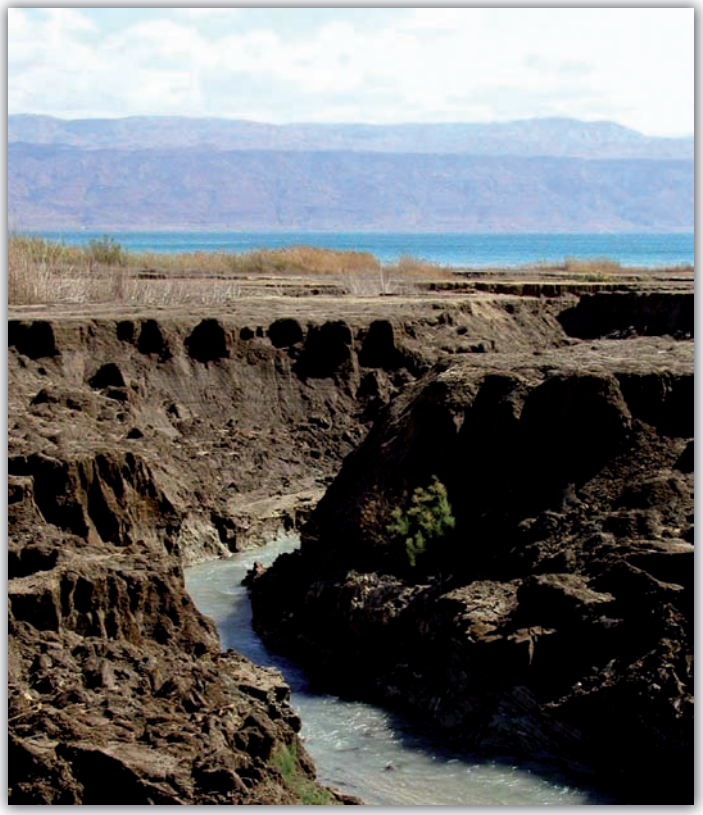
The Israelis are also aware (and from their perspective consider to be totally unrealistic) that the return of the Palestinian 1948 refugees will increase the number of people. This in turn will increase the Palestinian demand for the allocated/shared amount of water. This issue, however, is very much intertwined with the final status of the returnees, and under which conditions they return.

Palestinian perceptions of the Israeli concerns

Interestingly enough, the Palestinian Authority (such as the PWA) has made public its interpretation of the Israeli positions. This does not mean that their interpretation of the Israeli positions is 100 per cent correct, but it displays how the Palestinians perceive them, or at least wish them to be publicly portrayed.

XII Such as sustainable utilization, 'polluter pay's principles, and precautionary principles (cf. various environmental UN conventions).

As in any dispute, the fear of any Party is the intention of the other. The PA therefore fears that Israel is "trying to distract from its violation of Palestinian water rights by claiming that all available water resources are not sufficient to meet current requirements", and furthermore, that "what's behind this claim is a desire to rule out negotiations over water resources used now by the Israelis. According to Israel, there are no water resources to negotiate over, and both Parties should talk – but not negotiate – about co-operating to search for new water resources to be shared on an equitable basis" (PWA, 2004a: *the Political Framework*).



■ Photo 22.
The Feshka Springs of the Eastern Aquifer have eroded through the ground eastward to the Dead Sea

More specifically, *the PA has stated that Israel is arguing* that:

- "It is not possible to share a deficiency, but it is possible to co-operate in looking for new and additional water resources and work together to fill the deficiency. This is the only practical solution, and there is no other.
- The Israeli side is willing to discuss the issue of Palestinian water needs apart from politics, i.e. to deal with water rights as utilization rights only; the Palestinians will receive their water needs if available.
- The Israelis have no extra water, so they have decided to set up desalination units with a productivity capacity of 312 MCM.
- The Israelis hope to agree with the Palestinians on a co-operation and co-ordination mechanism for the protection of the aquifers through joint management.
- Israel does not want co-operation talks on water to be separate from co-operation talks on sewage.
- The Israeli side wants to separate water from other issues relevant to the permanent status negotiations.
- Israel's position is based on the 'first utilization' principle, and that the Israelis will not discuss their established rights in existing utilization. Their basis for their claim that they use the water by right is that Israel was utilizing prior to 1967 the same amount of water as now. (PWA, 2004a)

As for water resources in Gaza, the Palestinians understand the Israelis' positions as:

- The total quantity pumped from the ground aquifers in Gaza is 5 MCM, of which 2.5 MCM is supplied to the Palestinians.
- A further quantity of 2.5 MCM will be supplied to the Palestinians in the Gaza Strip from Israeli resources.
- The Gaza Strip will not obtain water from the West Bank aquifers, since those aquifers are shared between Israel and the West Bank.

The PA also believes that the Israelis want "the Palestinians to abandon their water rights and co-operate on looking for new water resources (e.g. seawater desalination, sewage water recycling, and importing water from Turkey)" (PWA, 2004a).

Furthermore, the Palestinian Authority summarizes the difference of opinions by stating that the "gap between the Israeli and Palestinian positions is very large".

As an external observer, a legitimate question would be whether the Parties' concerns are irreconcilable. The next chapter attempts to answer that question.

Chapter 4

A proposed approach to the water dispute

Various models for separate and co-operative water management

The intertwining of the ideological, economic, strategic, territorial and humanitarian aspects of the water dispute means that no solutions can be ascribed to a given water allocation formula in accordance with specific water quality standards. Any solutions must therefore address the Parties' real concerns in an incremental approach in which agreements are cumulative, in the sense that if the Parties agree on step A, they move to B and later to C, and so on.

Any solutions must address the Parties' real concerns in an incremental approach in which agreements are cumulative.

As with the preceding Golan Heights dispute, no proposal can be viewed in isolation from a larger agreed package. Sometimes this means that concessions in one area may yield benefits to another. The water dispute between the Israel and the PA, however, means that use of the water resources must be solved in one way or another, irrespective of any agreements in other sectors. The proposed solution should probably be viewed as an integral part of a comprehensive *peace* between the two Parties, but may also be applied in isolation in the case of the unfortunate situation in which a comprehensive Permanent Status Agreement is postponed.

Before turning to the concrete proposal, one may ask, also in this case: Why make the proposal public? There is an increasing need for water professionals to communicate to a larger public audience about *realistic* options, since there seems to be a gap between, on the one hand, the political rhetoric and aspirations, and, on the other, realistic technical solutions. In addition, a proposal from an external observer might be viewed differently from a proposal from either of the Parties. Finally, as in the case of the Golan Heights, the following proposal should be viewed in light of the fact that very little progress in the talks between the two Parties has taken place in recent years.

Unless responsible leaders and the enlightened public realize that each Party must have great flexibility in reaching an agreement, and equally important, full commitment in implementing it, human suffering will occur, as will continuous fighting over the water resources.

What does the proposal attempt to achieve?

This proposal outlines a way of making both Parties' positions *compatible* with each other in such a way that PA's and Israel's underlying objectives[XIII] are *fulfilled*.

More specifically, this means that the Israeli concern regarding management and control of the water resources on the West Bank[31] such that Israel's water use is secured in terms of quantity *and quality* regarding the aquifers shared with the Palestinian Authority must be fulfilled. At the same time, this must be compatible with the Palestinian territorial claims as well as their demand for sovereignty to develop and use the water resources on the West Bank and Gaza Strip.

As in the case of the Golan Heights, implementation of any agreement must be ensured by comprehensive water verification, monitoring and enforcement programmes.

This proposal is valid irrespective of the exact location of the disputed borders on the West Bank, as long as the interpretation of sovereignty over the disputed water resources is agreed on. If consensus is found on the principles in this proposal, the exact drawing down to the metre on the West Bank might be done at a later stage and at a more technical level (including the implications of the barrier/fence on the West Bank).

Both Parties will have their concerns addressed

Respecting Israel's sound water protection claim and Palestinians' water rights by meeting the water use needs of any population increase would incur additional costs to both Parties in the form of measures to mitigate water pollution and replace net water consumption.

Any agreements between them would involve the international community as a whole. Therefore, as in the Golan Heights case, any deal would entail a commitment from the international community to assist the Parties to establish and implement the agreements.

What kind of negotiable concepts may be applied?

As dealt with in the introductory section of this publication, the vague concepts of 'water rights' and 'sovereignty' should be clarified and translated into an operational context. A starting point might be that *sovereignty* encompasses both the notions of 'rights' and 'obligations', whereas the latter requires that every state or state-like entity is obliged to manage them according to national laws but also according to internationally recognized obligations (or even to religious law such as the *Sharia* for the Palestinians (see for example Haddad, 2000)). In this context, protection against pollution and over-pumping (of the aquifers) is one of the most important obligations of the two Parties.

Since water rights are interpreted differently in various parts of the world, this is perhaps the best argument for tailoring the three concepts of water rights (*ownership, control and use*) and the notion of 'obligations' into a meaningful and mutually-acceptable context of the West Bank and Gaza Strip. An official recognition of water rights was already granted to the Palestinians by Israel in 1992.[32] However, this raises another question: How to translate those obligations and rights into a mutually-accepted agreement?

XIII In negotiation terms: the Parties' concerns or interests.

Since experience on internationally-shared management of aquifers is meagre, it is not obvious that a proposed solution should specify all three concepts of water rights.

One could, for example, argue that an agreement on joint management would make such distinctions redundant.

There seem, however, to be two reasons why these three attributes should be translated into a *timelined agreement* or so-called *incremental step approach*. First, there is profound professional opposition in Israel to a dependency of the Palestinians in joint management of the Mountain Aquifer.[33] Second, since an incremental set of solutions is proposed, agreement on some of the attributes may be implemented at different stages in the implementation, as it is important for the PA to obtain an agreement so that long-term strategies might be developed.

The perceived politically-tempting concept of water rights is therefore a double-edged sword, especially for the Palestinians, as the notion of 'obligations' is equally strong. Israel has realized this even from a unilateral perspective. Over several years, and especially since 1999, its Water Commissioner has warned about unsustainable use of both surface and groundwater.[34] At present, Palestinian professionals[35] and the PA have officially recognized the significance of these obligations, but the Palestinian Authority does not have sufficient institutional, financial or enforcement abilities[XIV] to fully take on such obligations.

This reality is acknowledged by both Parties, and the questions would rather be:

- How can an agreement between them include incremental steps that would include transfer of water rights and water obligations in a sustainable and agreeable manner?
- How can implementation of these steps be enforced in a realistic and structured way?
- How can disputes between them be resolved during this process?

Anyone who claims that there are quick-fix answers to these questions is either naive or has limited real-life experience in the region. Therefore, the following alternative proposals have several reservations, particularly of a political nature.

Proposed solutions to the Parties' water rights and obligations

At present, no single formula or approach seems mutually acceptable. One formula that might seem appropriate at a certain point on the timeline may quickly be outdated due to a constantly-evolving political climate combined with dwindling water resources. However, the international community would have to act as guarantor for the implementation of whatever is agreed on. It may seem odd that the international community is counted in as a decisive factor in reaching any agreement, but unless stakeholders such as the US, EU, Russia and the UN (the *Quartet*) back any agreement on water, the chances are high that not only the proposed incremental step approach, but also any other approaches, may fail.

One may argue that a unilateral and isolationistic approach is favourable, as the risks are too high to rely on international stakeholders. The arguments probably bear some merits for the Israelis, but the alternatives also involve high

XIV The PWA has been granted this mandate in its water law generally (which was enacted in 2002), but it is assumed by most observers that it needs more time to take on such obligations – therefore, an agreed timeline is needed.

risks, especially related to depletion of the Mountain Aquifer System, unless an agreement has been reached with the Palestinians. Additionally, lack of a water agreement with the PA would be perceived by the Palestinians as politically and psychologically impossible[36], and could also deprive the Palestinians of basic human needs and rights that could (even from a national perspective) backfire on stability.

Questions to address in an incremental step approach (ISA)

Certain questions must therefore be addressed:

A) General questions.
- Who is the institutional and political entity accountable to for the agreement from each Party?
- What is the duration of the agreement – and what are the incremental steps?
- What are the *milestones* and how would the *review of the process* be conducted?
- What are the agreed procedures for reviewing performance?

B) Legal and practical interpretation of the four attributes of water rights separately and/or jointly and in geographic terms (both horizontally and vertically of the aquifers)[37]
- Who has ownership of which part of the aquifers and recycled water?
- Who has control of which part of the aquifers and recycled water?
- Who may use how much and at what time of which parts of the aquifers and recycled water?

C) Legal and practical interpretation of water obligations to use the water
- How is sustainable use conducted?
- How is environmental protection carried out and enforced – separately and/or jointly?
- How will breach of agreements be handled (punitive measures)?
- How to use the water resource in an economically efficient way?

D) Monitoring and verification procedures
- What kind of monitoring and verification procedures will be applied?
- What is the role of the *Quartet* as a guarantor?
- Who will finance the implementation of the agreement, and over what time period?

Some unresolved questions remain. For example, in case the Parties agree on 'compensation' to the PA in one form or another for foregone use of water on the West Bank (from a certain date), which parameters could be included and in which form? Another linked issue is compensation to the PA from the international community for guaranteeing maintainance of Israeli water uses downstream beyond an agreed level in terms of quantity and quality. These and other questions could therefore be discussed within the proposed incremental step approach.

The basic principle is that both Parties must have a sense not only that their main concerns have been taken care of in an agreement, but also that the chances of successful implementation of what is agreed on are higher than the risk of no agreement.

The need for incremental steps

It goes beyond doubt that the Parties must have some sort of minimum mutual confidence, which is necessary for the implementation of an agreement. Without such a gradual development of trust built into an agreement, proper implementation of even the most refined agreement will not take place. In *realpolitik*, however, no Party would enter into an agreement that would render it dependant on the other as

Outline of the incremental step approach

1. Agreement step → 2. Solidification step → 3. Implementation step → 4. Review step

regards vital strategic matters. Politicians from both Parties are proponents of water agreements that tie the Parties together, while others argue along unilateral lines. Likewise, the professional water community reflects this division (as argued in Feitelson, 2002: 10), including those that favour joint water management regimes such as the joint Israeli-Palestinian academic process (through Professors Feitelson and Haddad) (see Feitelson and Haddad, 2000)[38] or the 'opposing views' as expressed by Sherman[39] from the Israeli side.

As there are probably several ways to achieve such gradual implementation and development of a water agreement; one should be wary of

The following parameters could be included in developing mutually satisfactory formulas for water and recycled water for the West Bank and Gaza Strip. In addition, each parameter should be determined in relation to a timeline, such as 'at what time' and 'over what time period':

Separate and/or joint ownership of separate parts of the Mountain Aquifer System according to an agreed formula, such as X per cent by the Palestinian Authority, and Y per cent by Israel (and expressed in MCM): the Western Aquifer, the Eastern Aquifer and Gaza Aquifer – including recycled water.

Control of which parts of the sub-aquifers separately and/or jointly (meaning in this context a "mandate to protect the aquifer systems" according to a set of water management rules) according to an agreed formula, such as Z per cent by the PA, and V per cent by Israel (and expressed in MCM): the Western Aquifer, the Eastern Aquifer and the Gaza Aquifer – including recycled water.

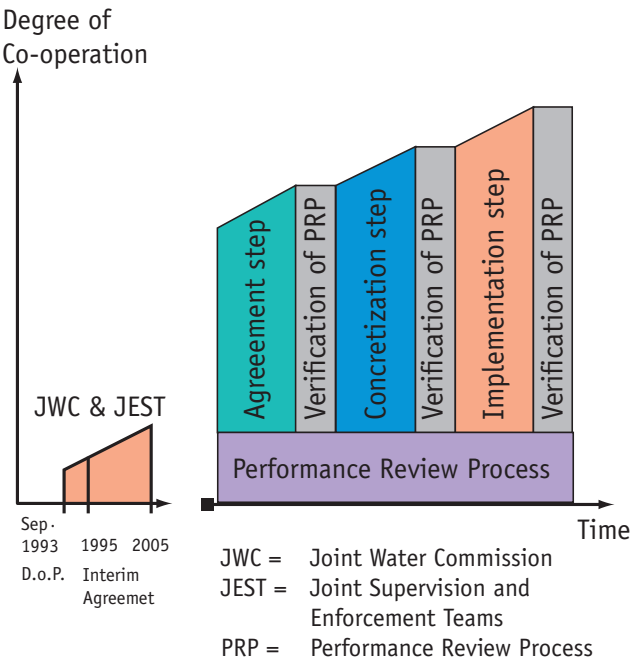
The amount of water shared/allocation (expressed in MCM) from the sub-aquifers might be determined in relation to:

a) what is already agreed in the Interim Agreement, 1995, Article 40, plus:
b) the number of people living in the West Bank and Gaza Strip, estimated separately multiplied by a certain amount of water per capita. It is anticipated that a certain number of Palestinian people will return to the West Bank and Gaza Strip under a final status agreement;
c) the amount of water to be leased to Israel in a transition period, or in a form that is mutually agreed on;
d) principles for tradable permits/quotas/water wheeling, which also includes trade and compensation mechanisms;
e) other related factors like joint arrangements for producing new and additional water resources; and
f) water balance management: use of the shared/allocated water according to a joint formula in relation to a sustainable yield (based on a set of hydrogeological/climatic parameters from the past 6-12 months).

proposing the 'one and only' approach.[40] Some of the inside proponents mentioned above have worked over several years on designing possible approaches. The proposed *incremental step approach* is therefore derived from the following sources:

- the Israeli and Palestinian experience of implementation of the Interim Agreement of 1995 (so-called Oslo II agreement, Article 40 – see Annex II), and especially with the experience gained by the Joint Water Committee and Joint Enforcement and Supervision Teams[41];
- as an example of different perspectives, with the common desire to manage the resourcesin a proper manner, the two Israeli and Palestinian scholarly proponents mentioned above, although not limited to the two;
- discussions over the years with officials and water professionals from the two Parties; and
- relevant lessons learnt (by the author) from other parts in the region.

Figure 11. An incremental step approach



Without agreement on an incremental approach, the chances of any agreement becoming viable appear slim. The following proposal therefore aims to answer some of the questions described above, implemented as a carefully structured and gradual approach. It may be divided into four incremental steps (see outline above, as well as *Figure 11*):

Any approach, whether it is incremental or not, must be based on certain agreed-upon criteria or so-called parameters. In this case, the Incremental Approach could be based on a Sovereignty Formula that specifies each Party's rights and obligations according to some specific parameters. In the textbox on the preceding page, some of these parameters have been outlined. A possible integration of the formula with the incremental approach is developed in the following pages.

Proposed approach: an incremental step approach

1st agreement step: Following decisions must be made:

5. Identify institutional and political entity(ies) accountable for the agreement from each Party.
6. Duration of the agreement in terms of years – and time period for each incremental step.

7. Milestones and the review process, and procedures for reviewing performance.
8. Determination of separate and/or joint ownership with regard to parts of the aquifers; horizontal, vertical and recycled water (see *Figure 12*).
9. Control of which parts of the aquifers and recycled water (see *Figure 12*).
10. The amount of water shared/allocated from the aquifers and recycled water (on a yearly basis; see *Figure 12*).
11. Principles for sustainable use – including extraction volumes according to agreed-upon parameters (such as last year's rainfall or annual yields at a certain reference point, etc.).
12. Separate and joint environmental protection measures.[42]
13. Punitive measures in case of breach of agreement between the Parties and within each Party.
14. The role of the Quartet[XV] as guarantor of implementation according to specific criteria (cf. especially, 3 above).

2nd solidification step: Following decisions should be made:

1. Harmonization of the Parties' water legislation.
2. Procedures for monitoring and verification.
3. Principles for using the water resource in an economically-efficient manner.
4. Development of a Strategic Master Plan for the West Bank and Gaza Strip that includes the elements described above.
5. Development of a Crisis Management Mechanism: conflict resolution and enforcement arrangement that should deal with all sorts of crisis management (see Feitelson and Haddad, 2000: 464).
6. Implementation of some selected protective measures[XVI] in tandem with the allocation above.[43]
7. Development of joint plans for manufacturing water,[XVII] including the establishment of an Escrow Fund.[XVIII]
8. The role of a larger international constituency in financing the implementation of the agreement.

3rd implementation step: Following actions should be taken:

1. Adjustment of the respective water legislation.
2. Implementation of agreed allocation of water between the Parties according to the formula agreed on in the 1st step, especially in relation to: 5) - 8) (ownership, access, control, allocation/share).
3. Continuation of implementation of protective measures in tandem with the allocation above.
4. Development of tradable permits/water wheeling mechanisms, including an Escrow Fund.
5. Implementation of joint plans for manufacturing water.
6. The Guarantor should review performance according to agreed standards.
7. Continuation to the 4th step, or implementation of punitive or other agreed measures in case of breach of agreement between the Parties and within each Party.

XV Russia, USA, the EU, and the UN.

XVI Anti-pollution; treatment; reuse etc.

XVII Such as desalination of brackish water and seawater or water transportation by ships.

XVIII It is implicitly recognized that some sort of joint initiatives will be undertaken – based on the fact that as long as a joint infrastructure has been developed in situations where the mutual gains are high, withdrawal from the project will also hurt the withdrawing Party.

An application of a sovereignty formula of water and recycled water in an incremental step approach for the West Bank

Ownership ("Property right entitling the owner of the economic value to the water")			
MCM:	Separate		Joint
	Israel	PA	Israel/PA
The Western Aquifer	V	I	X
The Eastern Aquifer	J	G	H
The Gaza Aquifer	X	K	L

Control ("Protect the aquifer systems" also include "monitor, and survey")			
MCM:	Separate		Joint
	Israel	PA	Israel/PA
The Western Aquifer	A	L	B
The Eastern Aquifer	G	D	E
The Gaza Aquifer	O	K	P

Transition phase Allocation/share for use ("Utilize/extract/pump for consumption and/or storage")			
MCM:	Separate		Joint
	Israel	PA	Israel/PA
The Western Aquifer	Æ	K	Å
The Eastern Aquifer	H	L	IX
The Gaza Aquifer	S	Ø	T
New and additional	A	P	Q

Final Allocation/share for use ("Utilize/extract/pump for consumption and/or storage")			
MCM:	Separate		Joint
	Israel	PA	Israel/PA
The Western Aquifer	I	II	III
The Eastern Aquifer	IV	V	VI
The Gaza Aquifer	VII	VIII	IX
Leased Water	X	XI	XII
New and additional water	XIII	XIV	XV

Note: The Mountain Aquifer is for hydrological and allocation/sharing purposes only divided into Western and Eastern Aquifers. The shaded numerals refer to *Figure 12*.

The 4th review step: Following actions should be taken:

1. Continuation of allocation of water between the Parties according to the *formulas* agreed on in the 1st step – especially in relation to: 5)-8) *(ownership, access, control, allocation/share)*.
2. Implementation of *protective measures* in tandem with the above allocation.
3. Implementation of 'tradable permits'/'water wheeling' mechanisms.[xix]

[xix] In this context, this means short-term licenses to use each Party's water – no sale of sovereignty as a whole would be involved. One such example could be sale of recycled water from the Gaza Strip to Israel for agricultural purposes in the Negev Desert, which will have a double positive effect – not polluting the Gaza Strip aquifer and providing saleable water to the southern part of Israel (see also Fisher *et al.*, 2002: 25-14).

4. Continuation of implementation of joint plans for *manufacturing water*.
5. The Parties and Guarantors should review performance according to agreed standards.
6. Continuation along the established lines, or implementation of punitive or other agreed measures in case of breach of agreement between the Parties and within each Party.

Unfortunately, the political rhetoric has so far focused on figures and the possible negative impacts of an agreement rather than on the suggested principles. This is why a performance review process must be an integral part of the water agreement.

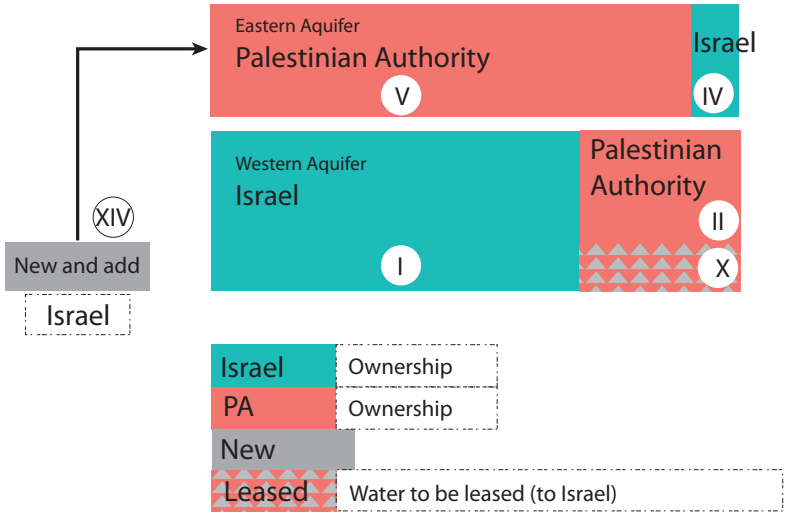
Application of a sovereignty formula together with an incremental step approach

The ISA should be based on an agreed formula, and some may argue that such an approach is worthless unless some hard facts and figures are agreed upon. The arguments bear some merit, but any agreement on the figures is probably also dependent on the provisions in the incremental approach. A possible matrix of how a formula may look is outlined in the textbox above.

The outlined formula may look quite complex, but this is attributed to the complex hydrology. Two quite different communities are involved, and there is an intricate water management history (such as different investment in infrastructure and degree of water consumption related to economic development).

One of the important points in the formula is the relationship between ownership and allocation/share of water. This distinction is made since the Palestinian proprietary rights (ownership) of the Mountain Aquifer System may be higher than the amount to be used (allocation/share) by the PA. It may be an optimal solution for *both Parties* for the Israelis to use a larger share from one of the aquifers than its proprietary rights. This is due to the fact that an expensive water infrastructure is already in place. From an economic perspective, Israel could, for example, lease water from this particular aquifer (e.g. from the Western Aquifer), but provide water to another (e.g. to the Eastern Aquifer, where the PA has a higher need) – as illustrated in *Figure 12*.

Figure 12. Example of application of a sovereignty formula in an incremental step approach for the West Bank – final phase



Note: The Mountain Aquifer is for hydrological and allocation/sharing purposes only divided into Western and Eastern Aquifers.

The need for a comprehensive performance review process by the guarantors

As outlined above, both Parties are concerned about the others' compliance with any agreements they may enter into. Both Parties not only want, but rather insist upon, the assurance of a mutually-accepted guarantor's review, verification and monitoring of the other Party's compliance, as well as the international community's implementation of the agreement. Such a mechanism is a prerequisite for implementation.

Internationally, the importance of verifying agreements is increasingly recognized, and the role of a guarantor should not be too controversial. The process would include reviewing and verifying all steps in the agreement to ensure that the Parties have made decisions and taken action in accordance with the agreement. The Parties shall harmonize rules for setting up and operating monitoring and verification programmes, including measurement systems and devices, analytical techniques, data processing and evaluation procedures.

As in the case of the proposed solution for the Golan Heights (*Section I, Part 1*), the guarantor should review performance according to clearly agreed-on standards and procedures.

What about the costs of implementation?

As in the case of the Golan Heights, how would external stakeholders view the cost of financing implementation of an agreement between Israel and the PA? There is of course no exact answer to this. However, they would probably view the cost according to what serves their foreign political and economic interests in relation to part of a settlement of the Israeli–Palestinian conflict and thereby the region as a whole.

It is hard to estimate the exact cost of implementation. Nonetheless, some scholars have estimated that this water conflict "...is unlikely to exceed \$100 M yr^{-1} and our results...show ... in fact less than that" (Fisher *et al.*, 2002).They go on to argue that "[s]uch amounts ought not to be a bar to agreement between nations". This line of argument implies that this water dispute is merely a dispute over money, not over life and death. An alternative cost estimate would involve asking "What are the costs of no agreement?" If human suffering is not treated as an externality today, the costs are obviously very high and will be even greater!

Such an economic perspective should not blur the political, cultural, social and strategic value of water for both Parties. For obvious reasons, the long-term political and economic benefits of peace, and thereby enhanced stability in the area, are obvious. The humanitarian impetus also appears obvious: unless the Parties, and especially the Palestinians, who already carry the weight of significant humanitarian suffering due to lack of proper water supply, obtain political and financial assistance for managing existing water resources as well as new and additional water, they will not be able to provide satisfactory water to their people. Dramatic changes need to take place in their production systems. Such changes normally take years, and in the short and medium-term the humanitarian cost will be far higher than today.

The humanitarian prerogative and 'peace dividend' therefore seem to be high enough for international stakeholders to commit substantial long-term funding to implementing the agreement.

How would the two Parties perceive such a proposal?

This proposal has evolved over several years in order to address the real interests of the Palestinians and the Israelis. It aims to reflect their genuine concerns, but as in every real-life situation there are different ways of looking at such a proposal. Most likely, both countries will favour a comprehensive and verifiable arrangement that is closely reviewed by a guarantor.

Although the 1995 Interim Agreement between Israel and the PA is of a temporary nature, the part on water (Article 40) contains detailed provisions for implementation that could be developed along the proposed lines.

Some constituencies within each Party may argue that this proposal falls short of a specific timeline and precise numbers of allocation/sharing as well as operationalizing the parameters of ownership, allocation/share and control of the various water resources. Such an argument bears some merit; it is not a final agreement, but the specifics of any agreement is an outcome of several independent factors such as the level of trust between the Parties, external stakeholders' involvement, the degree of compensation, extraction volumes at a certain period, the financing and speed of implementation of the various elements of an agreement, and the overall political settlement between the two Parties. In addition, global and local climate change may also affect the allocation/sharing, as well as the timeline in which the agreement is implemented. There are no complete, objective, fair and reasonable yardsticks between the Parties and in relation to the international community.

If the proposal is too specific at this point in time, it may therefore hamper development of constructive solutions rather than proposing principles for a water roadmap. One of the first concrete steps to be taken is to develop procedures for reviewing and verifying the Parties' implementation of an agreement (see 1st step, 3). Such draft procedures and principles may in fact be developed before the direct water negotiations begin.

Concluding remarks

Most Palestinians and Israelis would probably agree to the principles in the proposal, but some may ask: "Do we get more water than before?" Both Parties face grave water shortages in the near future – with or without an agreement between them. The agreement opens up opportunities – at least for the Palestinians – to obtain more water, although not to a level that satisfies the aspirations of some constituencies. There will be some who will always argue that enough is never enough, and that the notion of 'virtual water' will never be accepted.

The Israelis may argue: "What is in it for us, if we have to hand over water under our control to the Palestinians?" Some argue for the "restructuring of the entire water system so as to make the Israelis independent of all water sources under Arab control" (Sherman, 2001: 31). In case joint mechanisms are developed, what kind of insurance for compliance do we obtain and at what humanitarian, political and economic cost?

The longer an agreement is postponed, the more suffering will be inflicted on ordinary people, and the harder it will be to hammer out compromises and find a decisive solution. At the

The longer an agreement is postponed, the more suffering will be inflicted on ordinary people, and the harder it will be to hammer out compromises and find a decisive solution.

end of the day, any agreement made, or even lack thereof, lies with the Palestinian and Israeli leadership and people. It will most certainly be made in light of the overall political and psychological climate between them. Irrespective of this climate, solutions will exist – and the international community must stand ready to assist.

Endnotes

1 See for example a detailed and narrative overview of water issues in Palestine (pre-1948) and of different Israeli initiatives seen from an Arab perspective: Muhammed Ali Habash (1995).

2 Primarily through statements by Israeli officials.

3 See also Dreizin's (Israeli Water Commissioner Office) presentation at Stockholm Water Week, SIWI, 2004.

4 *Ibid.*

5 Cf. Gvirtzman (2002). See also Shuval (1992), which is much quoted as to how the sub-aquifers are connected.

6 The fluctuations illustrate the complexity of the management of the Mountain Aquifer:
- The winter of 1991/1992 was rainy in the Middle East. The recharge into the aquifers that year was around three times above average.
- 1992/1993 was also rainy, although less than the preceding year. After this year, the water reached its highest level. Then the pumping exceeded the recharge and the water level declined.
- 1999/2001 was characterized by three years of drought and the water level dropped to the 'Red Line'.
- When the water level in well MN got closer to the Red Line, Israel reduced the pumping in this region and pumped more from the central and southern part.
- The rainfall in 2002/2003 enabled Israel to pump more from Lake Tiberias, thereby relieving the pressure on the Mountain Aquifer.

7 Cf. PWA (2004a) and as outlined by Isaac and Owewi (2000).

8 Kawash (2003) states that 25 per cent of the aquifers have a high salinity (more than 2500 mg/l of chloride), 30 per cent have medium salinity (a range of 500-1000 mg/l), and 20 per cent have a relatively low salinity (a range of 250-500 mg/l). See also PWA, 2004b – presentation at the ESCWA Conference: UNESCWA, 2004.

9 In 2003, cf. PWA (2004b).

10 Cf. public information such as the Annual Reports from the Water Commissioner. Several of the policy instruments applied are illustrated in the publication from the Israeli Water Commissioner (2002).

11 See for example:
- Former Israeli Water Commissioner Menahem Kantor, Kantor (2000);
- PWA (2004a).

12 Also in conjunction with the so-called A, B and C areas. Cf. PWA (1999).

13 In addition, the PWA has further stated that: "…co-operation should include water resources, supply, and infrastructure", "….lengthy procedures should be avoided", "….data should be exchanged on all needed elements, especially abstractions" (PWA, 2004a).

14 Not much information has been presented from these initiatives, but the following web reference is one of the few descriptions of its contents: http://www.mfa.gov.il/mfa/peace%20process/regional%20projects/

15 See, for example, http://www.exact-me.org

16 Repeatedly and over the years stated by each of the three Heads of Delegation to the author.

17 The US, Japan, South Korea, the EU.

18 See the Israeli MFA's web-site for more information: http://www.mfa.gov.il/MFA/Peace+Process/Regional+Projects/The%20Red%20Sea%20and%20the%20Mediterranean%20Dead%20Sea%20canals. The level of the Dead Sea has dropped by a third since the 1960s and continues to fall by about a metre a year. See also UNESCWA (2004).

19 Cf. AFP, Amman on 10 May, 2005. In the first years of discussions, the Palestinians were left outside the project (as outlined in UN ESCWA, 2004).

20 See one of the most explicit and public expressions of regional co-operation in a presentation made by a leading Palestinian and Israeli official at the Stockholm Water Week, August 2004 entitled "Regional Co-operation on Water Issues", SIWI, Stockholm.

21 Like the US President Clinton (Clinton, 2004) to Prime Minister Barak, urging him to take bold steps at a 'historic time'.

22 For the first time, the Palestinian Authority has officially systematized its positions and made them public *via* the Palestinian Water Authority's (PWA) official statements in Kawash (2003) and in UNESCWA (2004). The description in the text is derived from the written material.

23 See also *Tahal Report* (1990) as outlined by Schwarz and Zohar (1991).

24 Cf. for example the description of former Israeli Foreign Minister Shlomo Ben Ami's diary as presented in *Ha'aretz Magazine*, 14 September 2001.

25 Cf. the official Israeli term of 'Security Fence' in their web address of February 2005.

26 Such as the Herzl Declaration at the first Zionist Congress in Basel, in Switzerland and in the early 1920s (cf. the role of the Zionist leader Chaim Weizmann and Justice Brandeis, the leader of American Zionism).

27 As reported in the Israeli newspaper *Ha'aretz*, 7 November, 1999.

28 As referred by Starr (2001: 26-27).

29 See for example the Israel Water Sector, August 2002, Ministry of National infrastructure and the Water Commission.

30 Even confirmed in PA's official documents: MOPIC, 1998: Chapter 5, and especially Chapter 7 (pp. 51, 53.)

31 The water resources in the Gaza Strip are somewhat more complicated since the Israelis as of 25 October 2004, as affirmed on 20 February 2005, decided on a schedule for pulling out settlements and military installations from the Strip – and the control of the water resources will be changed.

32 First officially documented by a letter from Avraham Katz-Oz (the former Minister of Agriculture and) at that time Head of the Israeli Delegation to the Water Working Group of the Multilateral Peace Process (at the Geneva meeting in 1993) to Head of the Palestinian delegation Riyad El-Khoudary, and later in the Interim Agreement of 1995, Article 40, Para. 1.

33 See two important letters: A memo from 1989 from former Agricultural Minister Avraham Katz Oz to at that time Prime Minister Yitzak Shamir regarding "Water security in the State of Israel now and in the future": "urging the Israeli Government to retain control of water resources in Judea and Samaria in any political agreements with the Palestinians", and another from the Israeli Water Commissioner to Prime Minister Yitzak Shamir of "Danger of loss of control over water resources in Judea and Samaria", in: Sherman (2001: Appendix VI and VII, respectively).

34 See for example the widely distributed publication from the Ministry of National Infrastructure and the Water Commissioner entitled *Reduce Consumption*, August 2002.

35 See for example Zarour and Isaac (1993: 50) or the Palestinian Hydrology Group (1999).

36 Several analysts with different vantage points have argued that water has to be transferred to the Palestinians in one way or another, see for example Mier (1994) and Shuval (1992: 133-143).

37 See Annex I regarding an example of one way of classifying 'water rights' of the various resources: Figure A1.

38 See also the newly published book from Fadia Daibes-Murad that deals extensively with this issue.

39 As outlined in some of his publications, such as Sherman (2001).

40 See for example a Palestinian perspective (before the establishment of PWA) in Zarour and Isaac (1993) or an Israeli perspective as expressed by Shuval (1992) (even before the DOP between Israel and the PLO).

41 See for example the joint Israeli/Palestinian presentation about regional initiatives in Keidar and Kawash (2004), as well as PWA's written documentation from PWA (2004a) (*the Political Framework*), which may be summarized as follows:

- "Goodwill and a genuine spirit of equality should prevail in implementation. Neither side should veto the water projects of the other side without just cause.
- Co-operation between the two Parties was realized to be essential and enabled the management of some good services in the water sector.
- Implementation should be timely enough to meet the basic water needs of the Palestinians.
- Unilateral implementation of projects should be avoided.
- Implementation needs to cover all areas, including area C, where there is the greatest need for water. Co-operation should include water resources, supply, and infrastructure.
- Lengthy procedures should be avoided.
- Data should be exchanged on all needed elements, especially abstractions.
- An example of the need for improved co-operation is the Jenin Project."

42 See also Sherman (2001: 30-33) who argues for joint, but also specifically separate measures both in terms of water supply and protection.

43 Cf. also Feitelson and Haddad's approach (2000: 465-466): i) qualitative and quantitative monitoring, ii) addressing the main threats to the aquifers, iii) comprehensive long-term issues, and iv) joint planning and funding.

SECTION III The Euphrates and the Tigris Rivers – solutions for Turkey, Iraq and Syria in managing water resources

Abstract

This section describes the challenges faced by Turkey, Syria and Iraq in managing the Euphrates and Tigris Rivers. The welfare of millions depends on the supply from the rivers, which are mainly fed by rainfall in the northern parts. The three countries are bound together by their destiny to use and protect the rivers. If this is not soon done properly, they could easily become *rivers of fire* with far-reaching national and international impact. As yet, there has been no agreement on how to manage the rivers.

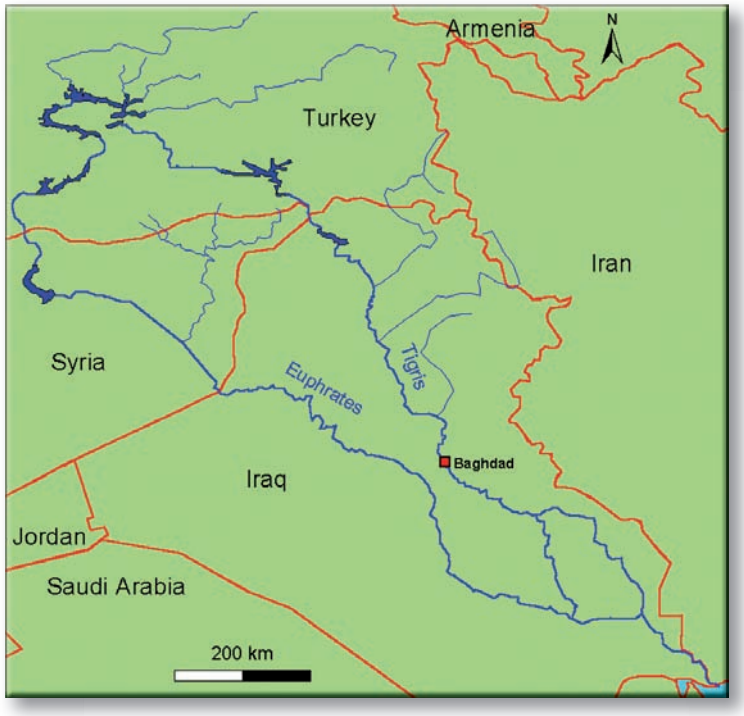
Internationally, little is known about the status of the waters. For the first time, therefore, information from Turkey, Syria and Iraq is made public. The countries have handed over authorized national data that has been applied in a comprehensive analysis of the river management. Although the study does not cover all aspects of their management, the technical findings are serious. They show that unless the three countries find ways to co-operate, the water quality may shortly be in a grave condition; particularly for the Euphrates in Iraq and subsequently in the southern part of Syria.

In order to adequately address this situation by maintaining a water quality level based on agreed standards, a desalination plant, in the first stage at the Syria-Iraq border, funded by a third party compensation mechanism, is proposed.

However, the challenges go far beyond the scope of a compensation mechanism. It is obvious that a *new overarching international initiative* must be taken: a Euphrates and Tigris Basins Initiative should be established with a partnership initiated and led by the riparian states. The initiative should benefit from full international support through an international organization such as the Arab development banks and institutions, together with, for example, the World Bank in co-operation with the UN.

The two main concerns – sound management of the water resources and respect of the Parties' interests – are incorporated so that the precious water may create an opportunity for co-operation.

Map 16. Location of the Euphrates and the Tigris Rivers



Chapter 1

Past, present and possible future use of the rivers

This section describes the immediate and enormous challenges faced by Turkey, Syria and Iraq in managing the Euphrates and Tigris Rivers. The welfare of millions of people depends on the supply from the rivers, which are mainly fed by rainfall in the northern parts.

The water belongs to the three countries. As of today, they have not agreed on how to manage the rivers. Since the water is of utmost importance for all three of them, the dispute has been lifted to the highest political level in the region.

Iran also feeds the Tigris river basin with 42 rivers that cross the 1,200 km-long and mostly hilly Iraqi/Iranian border. The author has limited the scope to the three riparians, since a bilateral co-operation agreement on the Tigris would most probably best be negotiated directly between Iran and Iraq.

Internationally, very little is known about the status of the two rivers. For the first time, therefore, information from Turkey, Syria and Iraq is being made public. These countries have handed over authorized national data applied in a comprehensive analysis of the water management of the two rivers, hereafter referred to as the 'technical study' (CESAR, 2005) or simply the study.[1] *However, this publication takes a perspective that goes beyond the technical results of the initial study.*

For the first time... information from Turkey, Syria and Iraq is being made public.

The study does not cover all aspects of management of the two rivers. Nevertheless, the technical findings are so serious that unless the three countries find ways of co-operating, the water quality of the rivers may shortly be in a grave condition, particularly for the Euphrates River in Iraq and subsequently in the southern part of Syria. Equally importantly, the water resources will not be used effectively and the shortfall between need and availability will grow even larger. Human suffering would escalate to such a degree that the international community could not be indifferent towards it, and would eventually become involved in the situation.

1 Although the three countries initially provided water resource data for the technical study, none of them is responsible for the classification, analysis and modelling of the information. They have not been requested to authorize any of the proposals made in this publication. In 2000, Turkey informed the author that it had withdrawn its authorized data for the technical study. All the authorized information was replaced with data from 'open international sources' (i.e. public Turkish information). However, that had no impact on the numbers and no changes were made to the conclusions of the study in the modelling or to the final outcome and technical recommendations.

Since the Middle East tends to have a surplus of problems and a deficit of constructive and sustainable solutions, this publication aims to rectify the latter. To that end, it describes, for the first time, the results of several rounds of consultations with the three states, as well as technical studies initiated in 1996/1997, resulting in thousands of pages of analyses and reports.

Credible and authorized data from the three countries were shared, and this information has been applied in the various studies and models. It is, however, impossible to transform the scientific findings directly to a water agreement. This is due particularly to the fact that the technical study chose to analyse the two rivers separately according to the so-called *separate-basin model*. However, it is subsequently acknowledged by the author that they could also be viewed as one basin, a so-called *twin-basin model*. By taking the Parties' concerns into consideration and deriving some of the technical results, elements for trilateral water agreements for the two rivers are proposed in *Chapter 5*.

Despite the uncertainties of transforming the technical findings directly into any agreements, this publication is probably among the very few, if not the first, to suggest a way out of the entrenched positions and problems.

The proposal is valid irrespective of the ebb and flow of the politics in the region

The three countries are bound together by the rivers – by a destiny to use and protect them. Yet if this is not soon done properly, they could easily become *rivers of fire* that would eventually have far-reaching international impacts. Countries inside and outside the region would then become involved, with unpredictable consequences.

Two rivers in the middle of a geopolitical minefield

Few, if any, rivers exhibit such historic affinities and associations as the Euphrates and Tigris. Over the millennia, it is not only the rise and fall of the ancient cultures of Mesopotamia, the Biblical dramas, the evolution of Islam and the growing Muslim dominance that have played out along and between the rivers, but also the rivers' role as a military and cultural crossover between civilizations from the East and West.

Some describe the ancient area between the rivers as the *cradle of civilization* from which intellectual and institutional advances were made, such as letters and scriptures, laws, accounting and monetary systems, and from which empires were built and fell over thousands of years.

Water disputes in the Euphrates and Tigris basins go back 6,000 years and are described in many myths, legends and historic accounts that have survived from earlier times (Altinbilek, 2004).

Contemporary history vividly illustrates the merging of the area's past and present significance, not only after vast oil resources were discovered in the 1920s, but also with the political dramas that have unfolded over the past two decades. The Iraqi–Iranian war of 1980-1988, and US-led coalition attacks in 1991 and 2003 on Iraq, took place on the plains of Mesopotamia, and underscore the strategic importance of the area. Until May 2003, the isolation of Iraq through UN-imposed sanctions created a distorted image of the state. Little, if any, international news about the dwindling rivers came out. Due to this geopolitical situation, little international focus has been placed on the water conflicts between the three states in managing the two rivers.

Preparation for the study – through numerous consultations with the three countries – began as early as 1997 and most of the basic scientific findings were completed in 2001. Some significant political events took place after this, with either short or long-term implications for use of the two rivers as well as their own resources:

Three events are particularly relevant: *first*, the coalition forces' attack on Iraq in March 2003 and the subsequent violent and unstable security situation, which, in addition to its major international implications, may result in transformation of a stable government and institutions; *second*, the increased tension between Iran and the US is also impacting on water co-operation; *third*, the Turkish accession process to the EU will potentially have implications for the management of both its own as well as international water, since the EU Water Framework Directive would be applicable to Turkey.

From more contemporary historic times and until the end of the Ottoman Empire in the early 1920s, the use of the rivers, primarily in the southern parts, has remained almost unchanged. After that, the three present states, Turkey, Syria and Iraq, obtained almost the same borders as today. The disputes between them stem back to the last 50 years (Altinbilek, 2004).

The relative abundance of water in more or less semi-arid and arid conditions in both Syria and Iraq has not stressed the water situation in terms of quantity or quality. The only constant and serious challenge to irrigation is the concentration of salt in the topsoil. Highly intensive irrigation as a basis for food production and the area's social-economic growth has characterized all advanced hydraulic civilizations in Mesopotamia. In many cases, salinization of the topsoil caused by intensive and improper irrigation practice led to collapse of food production and the sensitive water/soil-balance. The downfall of the advanced Sumerian Civilization in Mesopotamia more than 3,500 years ago is such an example.

Today, this salinization process is continuing to take place not only in Iraq, but also in Syria and even in Turkey. It will continue to do so unless mitigating measures are taken. The severe impacts would not be limited to Iraq alone, but to the river basins as a whole.

Today, the 'silent' majority of people who suffer from lack of water for drinking and agriculture are growing in number and in terms of severity.

The 'matter-of-fact' description of the water situation above may seem quite abstract as long as the immediate impact on the daily life of the people is not considered by international media to be catastrophic. Let it be quite clear: today, the 'silent' majority of people who suffer from lack of water for drinking and agriculture are growing in number and in terms of severity: ordinary people's access to clean water is rapidly becoming worse. On top of this, the two rivers are increasingly deteriorating. The situation is grave both for ordinary people and for the states.

Problems and conflicts in management of the rivers

In recent years, the academic literature[1] has reflected concerns about the hydrological status of the rivers and unilateral approaches taken by the riparian states. The exact nature of the problems have not, however, been internationally recognized due to lack of reliable data and the above-mentioned overall political situation in the region.

In 1996, Turkey and subsequently Syria proposed to the author that a trilateral study specify the *factual basis* of the water management challenges of the basins. Syria and Iraq expressed serious concerns about the nature and magnitude of the problems, with emphasis on different aspects. Altogether, this led to the start-up of a comprehensive process of consultation with the three countries and technical analyses in which interim reports were periodically conveyed to the Parties, with a final report in 2001. The findings outlined some serious water management challenges that need to be handled by all three of them. It is the author's impression that they understood the magnitude of the challenges and became concerned.

As in any major river basin, there are challenges in co-ordinating activities even at a national level, especially regarding optimal management of the flow of the river in relation to hydropower production and irrigation.

Turkey's impressive development of the water resources of the two rivers in the south-eastern part of the country, the so-called GAP project in south-eastern Anatolia, is unprecedented not only in the region but also compared to areas with a long tradition in river basin development. Turkey has mobilized national and international funding and expertise in this effort, and has probably to a large extent fulfilled the GAP's objectives. There are national and international challenges, however, such as optimizing hydropower production versus irrigation, and treatment of the return-flow from the vast irrigation areas that drain across the Syrian border.

A slowly growing and uncontrolled rise of the salt concentration of the Euphrates River in Iraq is taking place, assumed to be primarily due to return-flow from irrigation.

As a mid-positioned state (downstream of Turkey and upstream of Iraq), Syria also uses the water, especially from the Euphrates, for irrigation, while maintaining a certain discharge to Iraq. The Syrian master plans, however, assume a significant increase of water use, including water from the Tigris River. Up to now, much of the irrigated lands between the two rivers had come from natural rainfall and extraction of groundwater. More recent studies have revealed significant lowering of the groundwater table in these lands, especially in the north (close to the Turkish border). Due to the overall water situation in Syria, there are also plans to extract water from the Euphrates for drinking purposes in the large cities of Aleppo and Damascus.

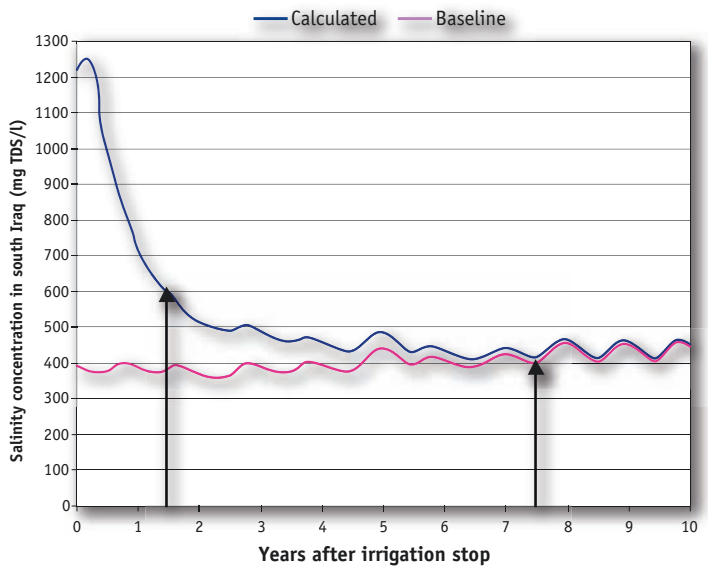
For the outside community, the water resource situation of Iraq has been largely unknown since 1990. More recently however, a bleak picture was drawn for the international community:

- "…the country's supply of clean water is being seriously threatened, because of shrinking funds…. and an outdated water treatment and sewage system.
- …country's 229 operating water treatment plants are old and badly in need of repairs.
- …sewage from cities and towns that lack processing networks - more than 90% of the municipalities around the country - seeps into the Euphrates and Tigris Rivers
- ..the Ministry provides services to 17 million Iraqis, or 70% of the total population. Of those 17 million, more than 30% have no access to drinkable water".[2]

Since 1991, much focus has been put on the marsh areas in the south and the anticipated 'politically driven drainage' (such as Clark and Magee, 2001)

of the area. This led even the United Nations in 2003 to make headlines like "*Garden of Eden* in Southern Iraq Likely to Disappear Completely in Five Years Unless Urgent Action Taken" (UNEP, 2003b). The situation in the south was, and still is, a challenge, far removed from the simple manner in which it is portrayed in the media.

Figure 13. Long-term effect of high salinity concentration in the river basin reservoirs followed by complete stop of discharge



In fact, the technical study revealed a far more significant trend. A slowly growing and uncontrolled rise of the salt concentration of the Euphrates River in Iraq is taking place, assumed to be primarily due to return-flow from irrigation.

The most immediate problem is the accumulation of the salt content, especially in the Euphrates River, to such an extent that it may be irreversible and unusable for drinking and even agricultural purposes for decades to come unless return-flow from irrigation is controlled.[3] This may happen soon, within a few years rather than decades, first in Iraq and then in the southern part of Syria.

Figure 13 shows results from a calculated salinity concentration in south Iraq after irrigation extraction has theoretically been stopped upstream (year 0 – see technical discussion of this simulation in *Chapter 3*). The salinity concentration would then gradually decrease to the natural state situation[II] (where return-flow from irrigation is not included).

It is, however, totally unrealistic to imagine that irrigation (and thereby return-flow from irrigation areas) will stop for 7.5 years under the current water management practices in the three countries. The reality of the situation today is that at the Syrian–Iraqi border the salt content is already very high (with high-average around 1,000 mg TDS/l).

In plain language, this means that water from the Euphrates River for irrigation in Iraq is threatened. According to Iraqi government sources from the Ministry of Water Resources, during parts of the year the water is unsuitable for drinking and irrigation in the southern part, especially in the Governorates of Basra, Dhi Qar, Qadisiya, Wasit and Babil. Considering the unbearable summer heat, it is hard to imagine the impact of this on people's daily life.[4]

II Probably a realistic and recommended level taking the natural water quality into account.

Photo 23.
The downstream side of the Ataturk Dam on the Euphrates River in Turkey

There is no agreed allocation of water quantity to each country

Although time is ticking away, the existing problem is solvable, but requires co-operative action between the three countries. A number of agreements have been reached since the 1920s, the most important era of the negotiations on the rivers being between 1980 and 1986 (Altinbilek, 2004), leading to the establishment of trilateral joint economic and technical commissions (see an overview in *Annex II*). After that time, and up to 2003, little – if any – progress in the deliberations was achieved.

Today, each country uses whatever amount of water suits them, within certain parameters. On the Euphrates River there are two bilateral arrangements, one temporary, and a unilateral dossier by Turkey on the Euphrates flow into Syria issued when Turkey's famous Ataturk Dam was filled up in the 1990s, obliging Turkey to provide an average annual minimum flow of 500 m^3/s at the Syrian border. Another, not yet officially announced (but commonly known), agreement is between Syria and Iraq, whereby the first has promised to provide Iraq with 52 per cent of what Syria receives from Turkey (while keeping 48 per cent for its own use).

Until now, no agreement on the Tigris River has been reached between the three countries. Today, Turkey and Iraq use the water, but Syria claims its rights from the 60 km river border it shares with Turkey.

Since there are no other agreements between the Parties, the following chapters attempt to provide a factual basis for the following hypothesis: optimal use of the Rivers in terms of hydropower production, irrigation and water for drinking purposes can only be reached if the countries co-operate.

There is no overview or agreement on safeguarding water quality

To date, the countries have not given high priority to monitoring the water quality of the rivers. Therefore, an overall understanding of the water quality in either of the rivers has never been achieved. Iraq made some calculations in the early 1990s, with however a high degree of uncertainty due to unverifiable water data from Turkey and Syria.[5]

As a response to that situation, three automatic monitoring stations were initially installed at three sites in Syria and one site in Iraq.[6] None of the data from these stations was used in the modelling, but the information has later confirmed the findings.[7]

Photo 24.
A manmade drainage channel for the Euphrates and the Tigris Rivers starting from west of Baghdad to the south designed with a projected average flow of 270 m^3/s

The more up-to-date measurements thus further confirm the overall conclusion that unless a river basin agreement is reached in the foreseeable future, in a relatively short time the water quality will reach a level in which water from the Euphrates is no longer suitable for drinking or agricultural purposes, at least with existing technology and practices, particularly in Iraq and subsequently in the southern part of Syria. It is beyond any doubt that the human, political and financial costs of rectifying this situation will be staggering.

The value of water

The discussion of the value of water is therefore becoming increasingly interesting. The findings from the initial study, briefly outlined, are new to the international community, and are being made public in order to increase international attention and efforts in assisting the three states in promoting sound water management practices for the two rivers. Some would perhaps argue that compared to other parts of the Middle East there is a relative abundance of water, for example compared to per capita consumption. This is true if figures are compared and not realities, but the facts on the ground are different:

1. All three countries have univocally given national priority to agricultural development, demanding a huge amount of water.
2. All three nations have claimed control and the right to use the water resources from the two rivers as an integral part of their territorial sovereignty.
3. Water has a tremendous cultural and spiritual value in the region, not only for the public, but also for the national leaders.

The author's approaches to the three issues are as follows:

1. Agricultural production may be viewed by economists as an essential economic commodity, whereby production should take place where the highest economic rate of return is, whether this is within or outside the country. The concept of 'virtual' or 'invisible water'[8] means that a country can balance its water needs by importing 'invisible' water from outside its national boundaries through import of agricultural products. It seems quite clear that from a strictly economic point of view, import of food ought to increase significantly in the years to come, simply because there is not enough water

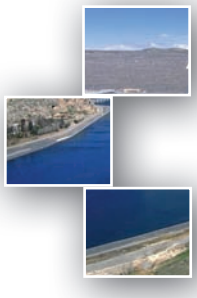
Unless a river basin agreement is reached in a relatively short time, the water quality will reach a level in which water from the Euphrates is no longer suitable for drinking or agricultural purposes.

to meet the rapidly-growing demand for food. In addition, and at a national level, if the negative implications of irrigation and especially pollution from return-flow are counted as an externality, the cost of food production will be even higher. Therefore agricultural production under existing conditions is, from an economic perspective, expensive and ineffective. However, and quite clearly, despite this situation none of the countries can change their respective agricultural practices in just a few years – decades of change are more realistic. In the foreseeable future, the economic perspective of irrigation at a national level is therefore more relevant from a theoretical and policy-setting point of view than in practical terms.

■ Photo 25.
Damside of the Tabqa Dam on the Euphrates River in Syria

2. 'Territorial sovereignty' is a vital concept for any state in ascertaining control over natural resources. Worldwide, so-called *fluid* or *flow resources* like oil and water are geographically defined, and thereby subject to division according to a certain legal formula (see Gjessing, 2002). Sovereignty over an international/transboundary renewable water resource means that states not only have *rights*, but equally importantly *obligations*, according to any international law that deals with international natural resources (as will be further discussed). Any country's claim of sole control is therefore more complex than is sometimes portrayed in national political rhetoric.
3. Water as a symbol of both physical and spiritual life is rooted in the people of the three countries. This fact is perhaps the overriding determinant for usage of water. Adoption of alien concepts like 'virtual water' that might lead to changes in the water management policy[9], and subsequently to another agricultural practice, cannot be carried out in one generation. Any outsider – irrespective of his/her scientific credentials – that overlooks this fact does not have a firm understanding of the realities in the region. Any policies that change the people's perception of this value are deemed to fail, unless they are implemented gradually and with sensitivity to people's beliefs and identity.

Before turning to what might be done by the Parties as well as by the international community, the three countries' positions and concerns are outlined in the next chapter. *Chapter 3* outlines the technical findings followed by a more detailed examination of those relevant for the two alternative models of co-operation proposed (in *Chapters 4–7*).



Chapter 2

Positions and concerns of Turkey, Syria and Iraq

The three Parties' perceptions on how the Euphrates and Tigris Rivers should be used in the future cannot be viewed in isolation from the history of the civilizations that have risen and fallen.

It seems relevant to draw a comparison with the use of the Nile River, which is shared by nine countries today. Egypt's use of the Nile is a historic fact, its entire civilization having been created out of the Nile River. Today, both Sudan and Ethiopia, among other countries, have ambitions to use the water of the White and Blue Nile respectively as part of their legitimate development efforts. One may ask to what extent management of other river basins in the region, like the Nile, form a precedent or at least have relevance for the Euphrates and Tigris Basins. There are no simple answers to this, but there is at least one important observation: the up-and downstream positions taken by the Nile Basin states will be influenced by what might happen in the Euphrates and Tigris basins, and *vice versa*. The situation of Turkey, Syria and Iraq has not been described in comparison with the situation of the Nile basin, but rather to illustrate covariance of the positions taken by Turkey and Sudan/Ethiopia versus Iraq and Egypt.

Since any interpretation of the positions and concerns of Turkey, Syria and Iraq is a reflection of the perspective of an *external observer*, a brief description of the consultative process with them is outlined.

Creating a consultative process with the three countries

Due to the author's long-term engagement in promoting peaceful solutions to water disputes in the region, contacts with the respective governments were initially made through professionals. Over the years, the author conducted several consultations with the states, first and foremost in order to understand their concerns. At the same time, the Parties were able to assess the author's credibility as an unbiased facilitator and professional capacity to develop solid scientific models and results. This part of the process took over two and a half years, and at a certain point in time the consultations became official in the sense that only official delegates, primarily from the respective Ministries of Foreign Affairs and Water/Irrigation, were involved. By 1998, all three states were willing to provide not-yet published or authorized water-related information to be used in a series of technical studies, based on a commonly accepted scope for the work.

From the outset, it became obvious that it was not possible to develop a thorough understanding of the hydrological systems and water management of the two rivers unless all three countries participated. Earlier on, Turkey had clearly recognized this fact and proposed in 1982 to the two other downstream Parties that a comprehensive study be undertaken jointly (the so called 'Three-Stages Plan') (Turkish Ministry of Foreign Affairs, 1996; SAM, 1996; Allan, 2002). The three Parties met over a number of years and exchanged data and plans (see *Annex 3*). As the Turkish proposal was further discussed, Syria and Iraq withdrew their participation.

Since that time, several countries outside the region as well as the UN (specifically FAO and UNEP) and the World Bank have indicated their willingness to assist the Parties. Quite a few international studies have also been conducted, using data of unknown reliability.[10]

The basic idea for any kind of co-operative river basin management is that a common and comprehensive technical understanding must exist. This was the reason for over two years of preparatory consultations with the Parties, to reach an agreement on the scope of the work, leading to the launching in 1998 of the technical studies. Through co-operation with the three countries, the aim was to develop an integrated water resource management analysis of the Euphrates River and the Tigris River in Turkey, Syria and Iraq, the analysis being based on water resource data from the respective countries (national authorized and publicly available data), as well as reflecting data derived from international studies.[11]

The basic idea for any kind of co-operative river basin management is that a common and comprehensive technical understanding must exist.

The development of the analysis was based on indirect co-operation between the countries where the author acted as a facilitator with whom data and information was deposited.[12] It was expected that the results and a proposed trilateral framework agreement would lead to a situation whereby documentation could be applied as a basis for further deliberations between the three countries on the principles of integrated water resource management in the region.[13]

The positions and concerns of Turkey, Syria and Iraq

A well-established diplomatic tradition is that "no country will carve its negotiation positions in stone" (see for example Trondalen, 2004a). In public, they have however taken fairly categorical positions, with little room for manoeuvering. The stakes are obviously high, since water is so fundamental, whether economically, socially, culturally or environmentally. Nonetheless, the positions may not be as irreconcilable as they appear at first sight. A key is to go beyond the political rhetoric and obtain an understanding of their real concerns. Any sustainable solutions ought to address these concerns.

The position and concerns of the Parties, as described below, are derived from publicly-available government web sites, public statements by officials, various official publications, and discussions with water experts and other government officials. The countries' positions have been slightly adjusted over time, but some constant traits can be identified.

The positions and concerns of Turkey

Turkey's principal argument is that no one country has a fixed claim to the waters of the

rivers, in the sense that historic usage of the downstream countries does not mean they have a "fixed claim on most of the waters, and only a very small residue above this to be shared".[14]

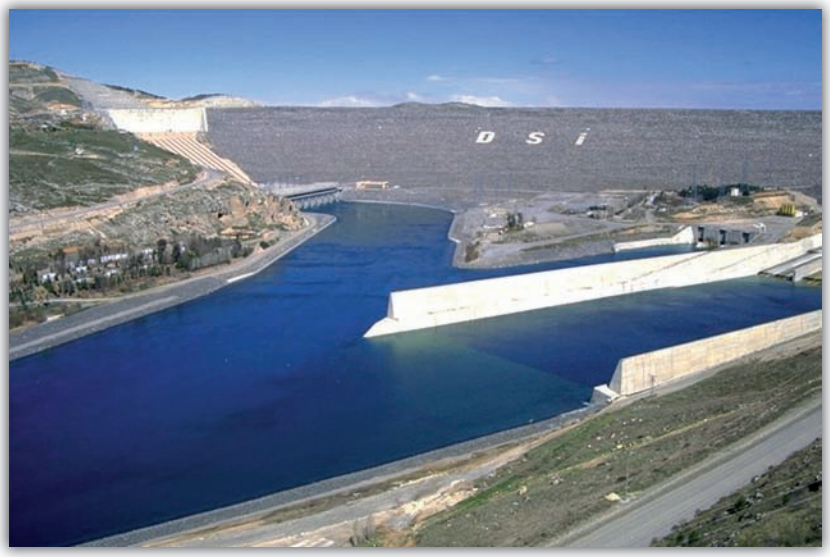


Photo 26.
The dimensions of the Turkish Ataturk Dam on the Euphrates River are enormous, with the sixth largest dam storage volume worldwide

Their perception of a fair deal is the recognition that all three states have rights, and that the rivers are to be used in an equitable manner.

Furthermore, Turkey is promoting a bi-/trilateral arrangement without interference of a strong international actor like the United Nations, since international law is relatively weak in defining states' rights and obligations.

Turkey is also taking a conceptual position regarding the terminology of the Euphrates and Tigris Rivers that they are 'transboundary waters', i.e 'rivers that are crossing state borders' versus rivers 'running along a border' (i.e. 'international waters'). The implication of this is that if the river is international the division will be different than if they are transboundary.[15]

Furthermore, Turkey argues that the Euphrates and Tigris Rivers must be considered as forming one single transboundary watercourse system, as they are linked by both their natural merging in the *Shatt al-Arab* as well as by the manmade *Thartar Canal* in Iraq.[16] As a consequence of the Euphrates and Tigris Rivers forming one single transboundary watercourse system, Turkey argues that the existing and future water uses need not be derived from one river alone, particularly the Euphrates River.[17]

Turkish authorities claim that 'equitable and reasonable utilization' is the most acceptable principle in international law in the allocation of a transboundary river. In order to reach equitable usage of the waters of the two rivers, various socio-economic, legal, hydrological and

Turkish authorities claim that 'equitable and reasonable utilization' is the most acceptable principle in in the allocation of a transboundary river. In order to reach equitable usage of the waters of the two rivers, various socio-economic, legal, hydrological and geopolitical factors in the riparian states should be taken into consideration.

Table 6. Area of the Euphrates–Tigris drainage basin in riparian countries (km^2)

	Euphrates		Tigris	
Country	km^2	%	km^2	%
Turkey	121,787	21.1	53 052	14.3
Syria	95,405	16.5	948	0.2
Iran	–	–	175,386	47.2
Iraq	282,532	49.0	142 175	38.3
Saudi Arabia	77,090	13.4	–	–
Total	576,814	100.0	371 561	100.0

Source: UNEP, 2001.

geopolitical factors in the riparian states should be taken into consideration.

Another argument is that the waters should be used in Turkey where the land capabilities and thereby economic efficiency is highest.[18]

This argument is further underlined by the overview of the area of the drainage basin in relation to each country as brought forward by one renowned Turkish expert (see *Table 7*) (Turkish Ministry of Foreign Affairs, 1996: 18). Since 98 per cent of the runoff of the Euphrates River and 53 per cent of the Tigris River is produced in the highlands of Turkey, an equivalent and equitable proprietary right is therefore acquired (Turkish Department of Information, 1992; Altinbilek, 2004).

In addition, Turkey argues that the damming of the two rivers in Turkey has benefited Syria and Iraq, since there is a significant reduction of flooding and loss of much-needed water for irrigation and power generation downstream during the summer season.

Turkey further states that "many lessons can be drawn from comparison between the Euphrates River and the Orontes River" (where Turkey is the end-user), as well as the fact that Lebanon and Syria are upstream and use the lion's share without any agreement with Turkey (Turkish Ministry of Foreign Affairs, 1996: 9).

In order to use the transboundary waters of the Euphrates and Tigris Rivers in an equitable, rational and optimal manner, Turkey has proposed a joint technical effort in which the three countries develop a factual water technical basis, the Three-Stages Plan, as an input into a water allocation scheme that "will determine the true water needs of each riparian country".[19] Turkey has clearly stated that optimal water usage based on the three countries' needs is unrealistic since the other two are overstating their demand (SAM, 1996: 6-7).

The above positions reflect a genuine national desire to develop the water resources as an important element in building a modern Turkish state. The symbols are strong, illustrated by the fact that Turkey perceives the GAP project as a legacy of the famous Turkish, post-Ottoman era leader Mustapha Kemal Ataturk: the dam-side of the Ataturk Dam is inscribed with the words "Proud is the one who can call himself a Turk" (see *Photo 26*). From a political view, this made sense, as Turkey used a significant part of its own wealth to develop the GAP project, with external actors like the USA, World Bank and United Nations initially supporting the

endeavour. The achievements in terms of dam and water infrastructure are impressive. Recently, the Turkish authorities seem to be increasingly recognizing the international rights and obligations that pertain to such international water courses. This recognition and the possible adherence to the European Union and thereby compliance with the EU's strict Water Framework Directive (van Baal, 2003) provide an opportunity for a trilateral agreement that could satisfy Turkish concerns as well as those of the two others. In addition, and equally important, Turkey has repeatedly stated that a "fair deal is possible for everybody" – an attitude which should pave the way for constructive solutions (SAM, 1996: 24).

■ Photo 27.
From a harvested cotton field in Syria

The positions and concerns of Syria

First and foremost, Syria states that it has acquired thousands of years of water usage, and that these 'acquired rights' were upheld even during the Ottoman era.

Up to now, Syria has used the principle of *grandfathering* as the most important argument in tandem with Iraq. The as-yet unpublicized agreement of the Syrian–Iraqi 48 per cent – 52 per cent division of the Euphrates water must be viewed from that perspective. Along this line, Syria has also repeatedly stated that it will not sign a bilateral agreement with Turkey without Iraq.[20]

Syria states that it has acquired thousands of years of water usage, and that these 'acquired rights' were upheld even during the Ottoman era.

In contrast to Turkey, Syria claims that the waters of the Euphrates and Tigris Rivers are international watercourses, i.e. "parts of which are situated in different States".[21] The difference is, from the Syrian point of view, only semantic and has no legal implications.

As in any modern state in the Middle East, Syria is increasingly relying on water resources in its social and economic development. Agricultural development, both rainfed and irrigation, has been a priority for decades (Daoudy, 1999). As an illustration of this, one of the few international agricultural research centres, the International Center for Agricultural Research in the Dry Areas (ICARDA), is situated close to Aleppo and in the vicinity of the Euphrates.

The national long-term water plans[22] therefore rely on the Euphrates Rivers as a source of drinking water for major cites like Aleppo and even Damascus, as well as for its ambiguous development of irrigation in the so-called Euphrates Valley. Due to rapid population growth, irrigation dependant on the Euphrates

River is increasing as the groundwater table is shrinking.[23]

Syria considers both the Euphrates and the Tigris to be international rivers (i.e. that the rivers should be treated as a shared natural resource), meaning that the waters should be allocated to each riparian state according to a negotiated agreement (primarily based on needs of each).

The Syrian position is that the two rivers must be viewed as two separate entities, based on the following arguments:

1. There is no surplus on the Tigris River allowing for any transfer to the Euphrates River.
2. The merging of the Euphrates and Tigris Rivers is downstream of Syria, and will not affect the use of water in other states (i.e. is not applicable to Syria).

Since Syria argues that the rivers are international watercourses, they must therefore be shared between the riparian states according to a quota that could be based on the following formula:

1. Each riparian shall claim its water demand on each river separately.
2. The capacity of both rivers (in each riparian state) must be calculated and agreed on.
3. If the total water demand does not exceed the total water supply, the water shall be allocated according to the stated figures on water demand for each riparian state.
4. In case total water demand exceeds the water potential of a given river, the exceeding amount should be deducted proportionally from the water demand of each riparian state.[24]

Syria is in a delicate position, as it must balance its interests as a downstream and upstream country. Its negotiation positions and concerns must be flexible and balanced, especially when it comes to the contentious question of water quality. Syria has on many occasions – and even recently – expressed concern about pollution from Turkey, not only in relation to the Euphrates itself but also regarding the *return-flow* from the large irrigation schemes just north of its long border with Turkey (between the two rivers).

The country's dual role as an upstream and downstream riparian also relates to its being situated downstream on the Orontes River[25] and Nahar El Kabir River from Lebanon, as well as upstream on the Golan Heights and Upper Jordan River Basin.

Syria has much to gain from a trilateral agreement, which would give it a predictable allocated amount of water with a certain level of quality. When this is achieved, the Syrian authorities could make long-term plans and obtain international assistance for sound development of their own water resources as well as for mitigation of pollution downstream to Iraq (see further discussion in *Chapter 6*). Syrian government officials are stating that they would eventually grant Iraq some of the same rights (for example, some sort of agreed-upon water quality standards) and obligations (such as a flexible allocation regime, which is dependent on preceding rainfall) if a trilateral agreement is established.

...Iraq maintains that it possesses *acquired rights* relating to its *ancestral irrigation* of the Euphrates and Tigris Rivers.

The positions and concerns of Iraq

Acquired historic rights of water are obviously the key argument of Iraq, illustrated by the following opening statement of its official dossier

Photo 28.
From the bank of the Tigris River that runs slowly through Baghdad city (as it looked in 1998)

regarding the two rivers: "The life in Iraq since eternity depends on the waters of its two great rivers..." (Iraqi Ministry of Foreign Affairs, 1999). The Iraqis further stress that "Iraq has preceded the States of the basins in the use of the largest quantity of the Euphrates waters. Prior to 1917, Iraq was irrigating over half a million hectares and then after that date, the irrigation projects and land reclamation have developed. With regard to the Tigris, it is known that Iraq was the sole state...which utili[z]ed the waters of this river since ancient times" (Iraqi Ministry of Foreign Affairs and Ministry of Irrigation, 1999: 25).

Iraq also argues that the waters of the rivers are international watercourses, i.e. parts of which are situated in different states.[26] As the Iraqis consider the rivers to be international, they should be treated as shared natural resources, i.e. the waters of the rivers can be allocated to each riparian state according to a negotiated agreement (as argued by Syria; primarily based on its needs).

Like Syria, Iraq states that the Euphrates and Tigris Rivers must be seen as two separate entities, based on the following reasoning:

1. There is no surplus on the Tigris River allowing for any transfer to the Euphrates.
2. The *Thartar Canal* connection between the two rivers (north of Baghdad) is manmade and only functions as a flood channel.
3. The fact that parts of the drainage basin of the Tigris river are also on Iranian territory makes the merging and negotiations relating to an allocation based on the notion of a 'one Euphrates–Tigris River Basin' unacceptable.

Not least, Iraq maintains that it possesses *acquired rights* relating to its *ancestral irrigation* of the Euphrates and Tigris Rivers. It also emphasizes two dimensions of the acquired rights, stating that for several thousand years the two rivers have given life to the people of the Mesopotamian Plain, constituting an acquired right to use these rivers. In addition, due to its long history of

Photo 29.
A part of the city of Baghdad bathing in the afternoon sun

use of the Euphrates and Tigris Rivers, Iraq has an extensive system of both modern and ancient irrigation and water infrastructure. The country has almost 3 million hectares of agricultural land, which is by far the largest in the river basins.

Photo 30.
A culvert for an irrigation field from the Euphrates River south of Baghdad

In the past, Iraq has declared that the waters of the Euphrates and Tigris Rivers must be shared among the riparian countries according to the following formula:

- Each riparian will present information about its present and planned water demand based on hydrological data on the Euphrates and Tigris Rivers that will be exchanged between the riparian states.
- In addition, as Iraq is experiencing deteriorating water quality, any agreement must contain rules, procedures and mitigating measures necessary to safeguard the water quality.[27]

The realism of their demands is such that Iraq will most likely advocate that any trilateral agreement should also take the upstream countries' interests into consideration. This recognition is, first and foremost, a reflection of the *realpolitik* in the region. Iraq is situated at the end of the rivers and dependent on a co-operative relationship with Syria and Turkey in managing the vital rivers. In addition, and increasingly so, the jeopardizing problem of water quality for Iraq[28] offers an opportunity for a sound trilateral agreement that Iraq will endorse and benefit from.

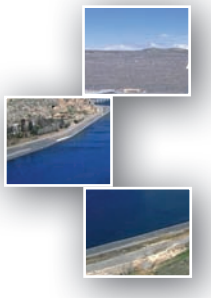
The concerns seem to be reconcilable

Despite diverging points of view of the three Parties on how to manage and allocate the two rivers, each of them acknowledges the need for co-operation.

One of the most prominent Turkish water experts, Dogan Altinbilek, has encapsulated the challenges by stating:

> "Uncoordinated and independent actions of basin countries may result in some difficult problems for which remedies cannot easily be found. With proper and coordinated planning and implementation, however, many or some of the problems may be pre-empted, eliminated or greatly minimized". (Altinbilek, 2004: 28)

The challenge then, is to translate this desire into accepted management principles that are feasible to implement.



Chapter 3

Findings of the technical study

Approach of the technical study

The three countries accepted the basic idea that for any co-operative river basin management, a common and comprehensive technical understanding must exist. From the outset, however, it became obvious that it was not possible to develop a thorough understanding of the hydrological systems and water management of the two rivers *unless all three countries participated*.

Therefore, the development of a comprehensive study of the two rivers had to be based on *indirect* co-operation between the watercourse countries. There was, however, no direct co-operation between the states, since all communication went *via* the author.

Before describing the design of the analyses and the findings, some information about the specific objectives and structure is outlined. Additionally, a few reflections on the realism of the cross-section between science and politics are also given.

One may argue that even reliable technical findings may not determine a trilateral water agreement between the three countries. Any technical results, irrespective of the scientific accuracy of the findings, will never fully determine a negotiated agreement between any countries, especially in the Middle East. The reality is far too complex for that and, as history has shown, any agreement is a reflection of the combined political, economic and hydrological circumstances at that particular point in time.

...any agreement is a reflection of the combined political, economic and hydrological circumstances at that particular point in time.

It is, however, incorrect to draw the conclusion that a technical study, irrespective of its accuracy and reliability, will have no impact on a negotiated agreement. As this chapter outlines, the findings are expected to provide input into possible negotiated trilateral agreements, not determine an agreement. The transferability of the (more) technical results to a (more) politically designed agreement is dealt with more extensively in *Chapter 4*.

The three countries have never been asked to authorize the technical findings *per se*, but rather to give input to the applied data, methods and analytical models. In *realpolitik*, no country would approve technical results that would limit their negotiation options, especially before they had started. However, the objectives of the study, approach and methods, and the technical

results were extensively discussed with the three countries.[III]

General objectives of the technical study

Initially, the technical study aimed, through co-operation with the three watercourse countries, to develop an:

> "[i]ntegrated water resources management analysis of the Euphrates River and the Tigris River in Turkey, Syria and Iraq. The analysis will be based on water resources data from the respective Countries (national authori[z]ed and publicly available data), but will also reflect data derived from international studies."[29]

Collecting, documenting and analyzing data on the water resource situation of the rivers formed the basis of the analysis.

The overall objective of the technical study was to outline a possible water allocation and water resources management strategy that would provide conditions for a sustainable river basin environment.

At the same time, and based on input from the countries, it aimed to maintain the highest possible irrigation targets in each of them. The decision was made to analyze the rivers separately, i.e. using the so-called single-basin model. To fulfil this objective, it was expected that the initiative would lead to the following short and long-term results:

- "documentation that may be applied as a basis for further deliberations between the watercourse countries on the principles of integrated water resources management in the region;
- processes that will encourage integrated water resources management through the application of Geographical Information Systems and modelling tools; and
- an optimal river management with respect to sustainable development."[30]

Analytical approach

The approach was based on a step-by-step integrated analysis with a focus on the most important elements to be included in a possible river basin management arrangement. In *Annex 3*, the water resource planning structure applied throughout the process as well as the role of the different working papers in this structure is outlined. The final technical report summarized and integrated the major findings previously presented in the working paper documents that were completed over the course of this analysis.[31]

Any comprehensive water resource analysis requires reliable and valid data in order to assess the status and compute the consequences of different river management regimes.[IV] The need for such data was accepted by all three states, and incidentally was the *raison d'être* behind the Turkish Three Stages Plan (see further outline of data and methods in *Annex 3*).

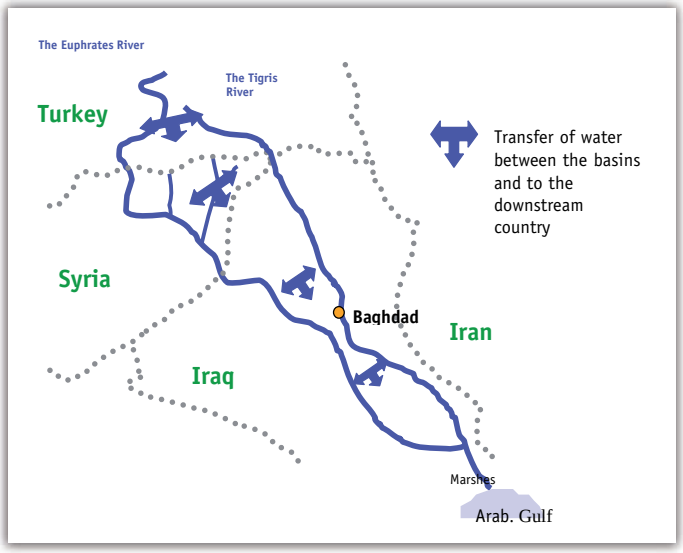
What are the implications of viewing the Euphrates and the Tigris Rivers as one single basin versus two separate river basins?

Turkey has all along argued that the two rivers should be 'treated', meaning that they should

III Turkey has not officially provided any feedback on the technical results.

IV A 'water management regime' simply means a water arrangement that specifies the use of water flow for different purposes on a certain timescale, and specifications of water quality standards.

Figure 14a. Water transfer: twin-basin model (treating the Euphrates and the Tigris as one basin)



be viewed, as a single basin, a twin-basin model, as illustrated in *Figure 14a*. By doing so, water could be transferred between the rivers within each country in order to optimize national water usage. A crucial and legitimate question arises from this statement:

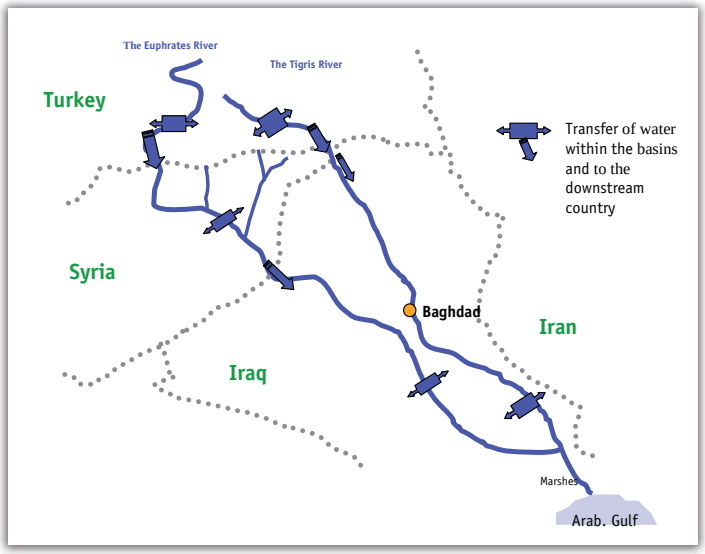
How should a study be developed if the two rivers are considered as one?

To date, Turkey has not provided a clear answer to this question, and no basin study has been conducted. However, if a single-basin study is developed, it should encompass at least the following considerations:

- each country could be given a certain amount of water to optimize within each territory;
- Syria and Iraq could receive a combined or a separate amount of water from the two rivers; and
- the states must agree on certain water quality standards of both rivers as they cross the borders into Syria and into Iraq.

From a practical and scientific point of view, this is feasible and may even have some merit. The initial study, however, is based on the separate-basin approach (see *Figure 14b*) because the preliminary

Figure 14b. Water transfer: separate-basin model of the Euphrates and Tigris Rivers



investigations anticipated that each country would receive a smaller allocated amount if the *twin-basin model* was chosen. Eventually, the findings from the study to a large extent confirmed this assumption, although not unambiguously as a comprehensive modelling of rule-curves with transfer of water between the rivers was never conducted. It must be recognized that this is a significant limitation of the technical study.

If, eventually, the countries decide to pursue a *twin-basin* approach, some sort of new estimation for optimized and co-ordinated use of the rivers must be designed, since water between them should certainly not be transferred randomly into the other river basin at any given time. The technical study has revealed that this is a highly complex matter. Therefore, despite the previously stated political positions on this matter, it would be wise for all three countries to establish a factual basis before a final judgement is made on the separate-basin model.

River basin description

General

Although it may seem obvious, the main characteristic of rivers in general is their continuous one-way flow in response to gravity, and this fact has a special significance for the two rivers due to the vast geographical area. In addition, due to changes in physical conditions such as slope, uncompacted material and bedrock geology, rivers are dynamic and may change several times during their course. When assessing the characteristics and water quality of the two rivers, it is important to bear in mind that they comprise not only the main courses, but also a vast number of tributaries (even from Iran into Iraq as regards the Tigris).

The rivers are greatly influenced by the characteristics of the catchment area, such as the climatic conditions influencing the water flow as well as geology in general (including alluvial deposits), riverbed characteristics and soil type. The latter also affects the mineral content of the water in the rivers.

In addition, exogenous factors such as activities within the basins affect the river systems in numerous ways, such as through forestation or deforestation, urbanization, agricultural development, land drainage, polluted discharge and flow regulations.

It seems evident that in order to obtain an overview of how the flow of the rivers varies over time, how the water quality changes as well as how the exogenous factors contribute to determining the surface and groundwater, a long-term perspective must be taken. Applications of long-term data series, but also inter-generational perspectives, were made in the study.

In the following text, a brief introductory description of the two rivers is given followed by specifications on use in Turkey, Syria and Iraq.

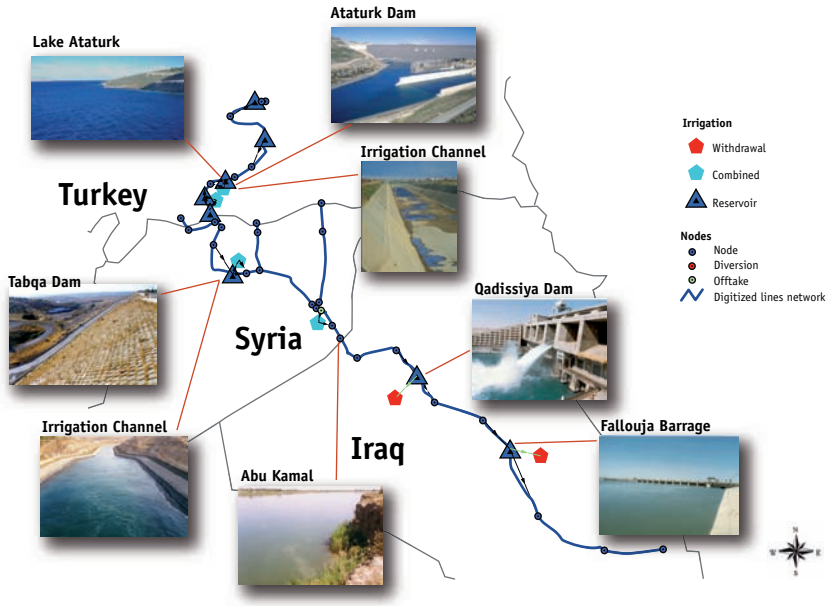
The Euphrates River

The Euphrates River is formed in the mountains of eastern Turkey by the confluence of the Murat and Karasu rivers at the Keban reservoir (north of the Ataturk dam in *Figure 15*). The main source of runoff in the catchment of these rivers is snow.

The Euphrates River flows southward, crossing the border with Syria at Jarabulus. Downstream of the border, the river is first joined by the Sajur River from the west, and further downstream by the Balikh River and Khabour River from the north.

These two rivers receive most of their water volume from springs immediately south of the border between Turkey and Syria, and have most of their catchments in Turkey (Kolars and Mitchell, 1991). After the entry of the Khabour River, no further water is added to the Euphrates River from permanent sources. Since 1995, little or no runoff has been recorded in the Khabour River and Balikh River.

Figure 15. Overview of the Euphrates River Basin and main model elements



The Euphrates River enters Iraq at El Qaim south of Abu Khamal. Further downstream at Hit, it enters its alluvial plain, which is covered with fertile alluvial soils and formed by silt deposits from the Euphrates River. After confluence with the Tigris, the two rivers form the Shat al-Arab (Kliot, 1994).

The Tigris River

The Tigris River originates in the mountains of eastern Turkey. The first source is known as the Tigris River branch and the other as the Batmansu branch. These two branches are joined together near Ceffan to form the Tigris River which flows southward through Turkey. This then forms the boundary between Turkey and Syria before entering Iraq. Here, the Tigris River enters its alluvial plain between Fatha and Samarra. Unlike the Euphrates, the Tigris River receives water from several tributaries originating in the east. The first of these tributaries is the Greater Zab, which rises in the mountainous area around Lake Van in Turkey and enters the Tigris River between Mosul and Fatha in Iraq. The second tributary is the Lesser Zab, which originates in the Zagros Mountains in Iran and enters Tigris upstream of Fatha. The third tributary, the Adhaim River, enters Tigris between Samarra and Baghdad. The Adhaim, which flows entirely within Iraq, is a very small contributor to the Tigris River. The fourth tributary is the Diyala River, which originates in the Zagros Mountains in Iran and enters Tigris a few kilometres downstream from Baghdad. The last major tributary is the Kharun River, which originates in Iran and enters the Shatt al-Arab downstream of Basra.

In contrast to the Euphrates, the discharge of the Tigris River increases with distance downstream, as most of its water is added through the tributaries in Iraq. As the sources for the Tigris discharge are located further downstream, its lower parts are more prone to flooding than the lower parts of the Euphrates River.

Use of the Euphrates and Tigris Rivers in Turkey

The two river systems constitute about 50 per cent of Turkey's total surface water supply (see EIE web site).[32] The country also has a good supply of groundwater. Turkey embarked on its efforts to develop the Euphrates and Tigris in the 1970s. Due to the emphasis on industrialization in Turkey, the development of hydroelectric energy has received priority over other aspects of water usage, while irrigation has mostly been secondary. The increasing need for energy has led to a drive to expand hydropower as a source of energy totally owned by Turkey.

Through the south-eastern Anatolia Project (GAP), Turkey plans to foster regional and national socio-economic development by using the waters of the Euphrates and Tigris Rivers to increase electricity production and irrigation. The GAP consists of 22 dams, 19 hydroelectric power plants and 25 irrigation systems. If it is fully implemented, approximately 1 million ha of land will be irrigated with water from the Euphrates River; while another 600,000 ha will be irrigated with water from the Tigris River. On completion, the GAP with generate altogether 27 GWh/year (on Euphrates and Tigris with 20 GWh and 7 GWh, respectively)(GAP, 1996) and will double Turkey's hydroelectric production and increase the irrigated land by approximately 50 per cent (Broch and Lysne, 1992).

As described, the GAP is a central part of the Turkish government's ambition to raise income levels in south-east Anatolia, which borders both Syria and Iraq. About 70 per cent of the working population in the region are employed in agriculture (EIE web site). Farming today, however, is characterized by low productivity due to inadequately watered soil. With its new irrigation schemes, GAP aims to introduce intensive and profitable farming to the region. The expected increase in agricultural production may create new employment opportunities, trigger industrial growth and raise income levels in the region. Although hydroelectric development provided the initial incentive for the GAP, other aspects of the project are also of importance to Turkey.

Until now, Turkey's developmental efforts have focused on the Euphrates River, on which the largest dam of the GAP, the Ataturk Dam, is located (see *Photo 26*). When fully developed, it will contribute 7,500 MW/year, which is one third of GAP's total energy production, and irrigate some 500,000 ha of land (EIE web site, Altinbilek, 2004). With the GAP, Turkey's use of the Euphrates and Tigris Rivers can be expected to increase substantially in the future. The use of irrigation water, which has mostly been of a local character, is expected to expand rapidly in the future, especially around the Ataturk Dam.

Use of the Euphrates and Tigris River in Syria

Prior to 1950, Syria used little of the Euphrates waters. Use of Euphrates started during the 1960s and 1970s. Today, the river is very important to Syria, as it constitutes some 80-90 per cent of its surface water supply. In addition, Syria has a supply of groundwater, much of which has been overpumped and degraded by sewage and agricultural drainage.

Agriculture is very important to the Syrian economy. Consequently, Syria plans to increase its irrigated area (World Bank, 2001b). Dams for this purpose have been constructed on the Euphrates and Khabour Rivers. The future discharge of the Khabour River (and the Balikh River, which is mostly used in Turkey) is difficult to assess due to uncertainty on Return-flow from the Urfa Harran Plains, as well as Turkish pumping of aquifers supplying the springs in Syria. In addition, Syria plans to start pumping the Tigris River water for irrigation. Despite previous efforts to increase its irrigated area, there seems to have been a net loss of irrigated land since the early 1960s (see EIE web site). Land scheduled for irrigation in the Euphrates Basin has had to be abandoned as a result of various factors, such as soil characteristics, waterlogging, salinization and land reforms. Consequently, it is difficult to establish the amount of planned irrigated land that will actually be implemented in Syria.

In addition to supplying water for irrigation, the Tabqa Dam on the Euphrates is important for electricity production. At its peak, this dam provided 60 per cent of Syria's electricity (in 1979, cf. EIE). However, low water levels have often left the turbines idle, thus making hydroelectricity an unreliable source of energy in Syria. Lake Assad must be kept full if its hydroelectric potential is to be realized. This conflicts with increased water demands for irrigation projects and domestic consumption. Aleppo and the surroundings, for instance, are increasingly dependent upon Lake Assad for domestic, industrial and irrigation water supplies (EIE web site). The combination of the rapid growth of urban populations and a lack of reliable potable water supplies have already resulted in water shortages in Syria's urban sector. Thus, providing reliable water supplies to growing urban populations is an important future concern for Syria.

Use of the Euphrates and Tigris Rivers in Iraq

Use of the rivers began in Iraq in ancient times. Due to the high seasonal and annual fluctuations in the discharge of the rivers, water storage capacity is an important aspect in managing the water resources in the basins. In Iraq, water control structures have been in use since ancient times to prevent flooding and to irrigate land in central and lower Iraq. When the earliest Mesopotamian civilizations were at their peak, they supported large populations based on well-maintained irrigation and flood control structures, such as the Habbaniya and Abu Dibbis Lakes. Also in modern times, Iraq was the first country to start using the Euphrates and the Tigris waters. Modern engineering work in Iraq began with the construction of the Hindiya Barrage on the Euphrates during the years 1911-1914. It has continued since then, mainly to supply water for irrigation in the basin. Dams have been constructed on both rivers and their tributaries.

Approximately 98 per cent of the total surface water in Iraq is related to the Euphrates and the Tigris and their tributaries (Broch and Lysne, 1992). Iraq also has a small supply of groundwater. About 90 per cent of the water consumed in Iraq is used for agriculture.

Due to shortages in the urban water supply to cities like Baghdad and Mosul, Iraq must expand its domestic water supply. As a result of large oil reserves and the physical characteristics of the rivers, Iraq has no urgent plans for hydropower. Still, there has been a trend towards enlarging the hydropower capacity, and all new dams in Iraq have substantive hydroelectric capacities.

It is not easy to present a picture of Iraq's social and agricultural activities related to water use

after the Gulf War in 1991, especially in the aftermath of those events. Some water infrastructures in Iraq have been degraded or damaged during and after the recent years of war in the country.[33] The Gulf War, subsequent UN sanctions (which among other things initially put a ban on dual-use items such as pumps) and the 2003 war also resulted in the disruption of electrical generation in Iraq, consequently halting water pumping for domestic and agricultural purposes including drainage. Major water and sewage treatment projects as well as modern drainage systems to alleviate soil salinity problems were initiated before the three wars.[34]

Photo 31.
On the riverbanks of the Euphrates in the southern part of Iraq

There is little available information on the present state of these projects, except for repeated statements by the Coalition Forces in 2004 that water and energy were priority areas for international funding.[35] These statements have been affirmed by the new Iraqi Government.[36]

Since Iraq is located furthest downstream on the Euphrates and the Tigris, all river developments undertaken in Turkey and Syria may have an impact on the water flowing into Iraq. Because Iraq has the largest population within the basins of the two rivers, it is obviously vulnerable to any changes in the quantity and quality of the water received from its upstream neighbours.

Economic efficiency of water – the Euphrates River in GAP

While keeping in mind that the study is based on a separate-basin model (as outlined earlier), the relationship between energy production and irrigation on the Euphrates in the GAP area would determine how much water may be used in Turkey versus the two other downstream riparians. It is therefore important to understand how energy production and irrigation could be optimized from an economic perspective, as well as how that would influence potential negative environmental impacts.

The reason for focusing on Turkey is because use of the water in the GAP obviously has a major impact on the downstream countries both in terms of quantity and quality.

In the GAP project, two major activities generate economic outputs: hydropower production and agricultural production. These two activities 'compete' for use of water. Power production favours retaining the water in the watercourse, while increased agricultural output demands extraction of water from the watercourse. From an economic point of view, it is interesting to define the balance between power production

and irrigation in order to identify the use that provides the highest potential national net benefits.[37] The following aspects were therefore dealt with: power production; the value of power production; crop increases due to irrigation; and crop value analysis.

A set of conditions are outlined in the study, but what is of relevance in this context is the overall result. Although the analysis is not based on verified national Turkish data, and the assumptions made deviate somewhat from national figures, the study concludes that:

- a new analysis could be performed based on revised national Turkish data in order to increase the degree of verification;
- from an economic perspective, Turkey should use less than the estimated 10 billion m^3 per year if no mitigating efforts are put in place (such as treating the return-flow from irrigation and pollution). If the downstream countries' effects are accounted for – which they must be in one way or another – the amount used for irrigation will be significantly smaller.[38] A new analysis could be performed based on revised national Turkish data in order to increase the degree of verification.

Available and planned extraction of water from the rivers[39]

The Euphrates River

When the natural river flow was only disturbed by limited extraction of water for municipal, industrial and irrigation purposes, average annual runoff was calculated at 31.6 billion m^3 at Biercik (close to the Turkish–Syrian border, 1938-1972). Together with the runoff of 2.7 billion m^3 in Syria, the total amount becomes 34.3 billion m^3. At Hit (north of Iraq, 1925-1969) it amounts to 29.4 billion m^3 (see *Figure 16*).[40]

The study further presents the applied long-term average total river flow (catchment runoff) and planned use (so-called net irrigation extraction) in Turkey, Syria and Iraq (see *Figure 17*).[41]

The Tigris River

Water quantity data

Annual runoff at the Cizre gauging station (close to the Turkish–Syrian border) for the period between 1948 and 1994 is presented in *Figure 18* (Bilen, 1997). This set of data consists of measured values and includes changes in flow conditions caused by the establishment of reservoirs over recent years.

Figure 16. The Euphrates River: comparison of available water volume and predicted demand

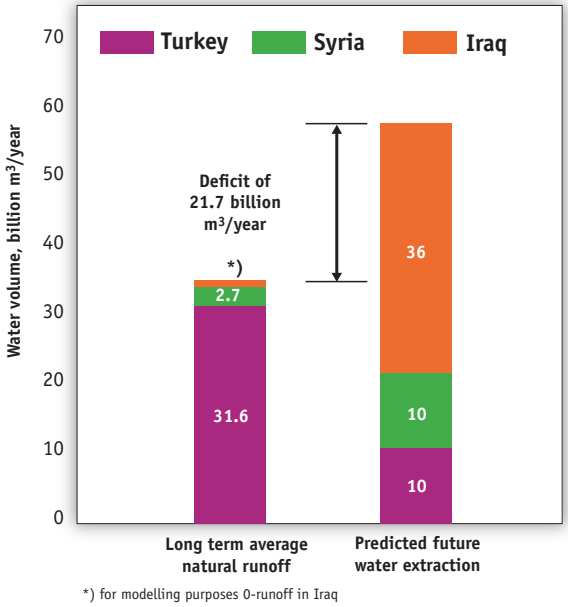
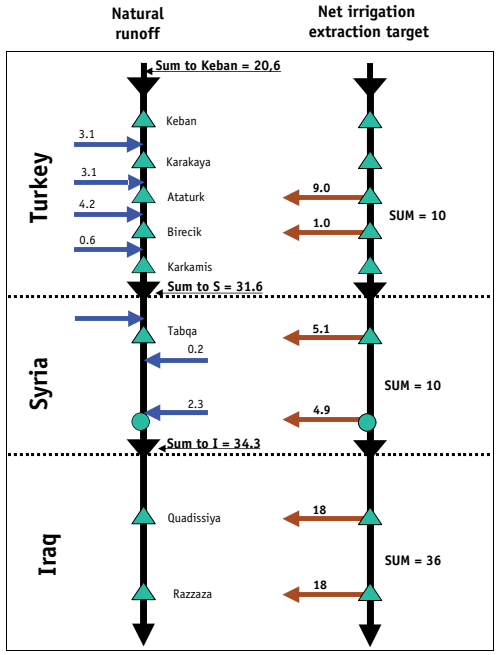


Figure 17. The Euphrates River: estimated long-term average total catchment runoff (left) and net irrigation extraction target as defined by the respective countries (right) in Turkey, Syria and Iraq (billion m^3/year) (assumed net inflow of 2.7 billion m^3/year in Syria, and assumed no net inflow in Iraq)



that must be considered when analyzing model output. Despite these limitations, the models can provide comparisons between water management alternatives. They are built to evaluate such long-term alternatives and the actual numbers derived are simply good indicators of trends.

A large number of results have been generated with a complex set of scenarios. Different models relating to both water quantity and quality have been applied to both rivers, except for water quality modelling of the Tigris due to lack of available data from the river. In the latter case, however, there are no reasons to underestimate the water quality challenges in Iraq.

In order to assess the recorded water quality in the Euphrates River, internationally accepted water quality standards were applied as standards of reference with a focus on drinking water and irrigation purposes, to:

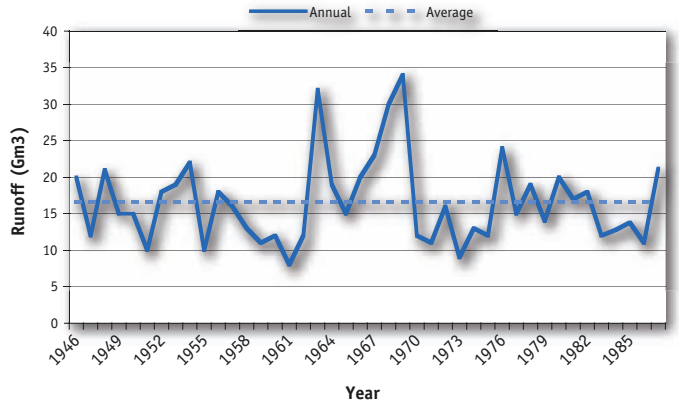
- develop new models or modify existing modelling tools in order to perform sensitivity analyses of major parameters affecting the water quality;

Modelling of power production, discharge and water quality

In order to obtain a more comprehensive understanding of the flow, regulation and impact on the flow and quality of the rivers, two renowned but different modelling tools were applied.[42]

The technical study underlines that such models are merely best estimates of possible future events, and because the latter are unknown, models have limitations

Figure 18. The Tigris River: annual runoff at Cizre gauging station, 1946–1987



- describe and simulate possible future changes in salinity along the Euphrates River due to different irrigation strategies;
- evaluate effects of conveying water from the Tigris into the Euphrates in Iraq;
- assess the long-term effect of a deteriorating water quality;
- identify the full net irrigation extraction target; and
- reduce the net irrigation extraction target to 6 billion m^3 per year in Turkey and Syria.[43]

Quite a few conclusions may be drawn from the matrix in *Table 7*. In this context, however, just a few relevant points (for the proposals in *Chapter 5*) will be highlighted.

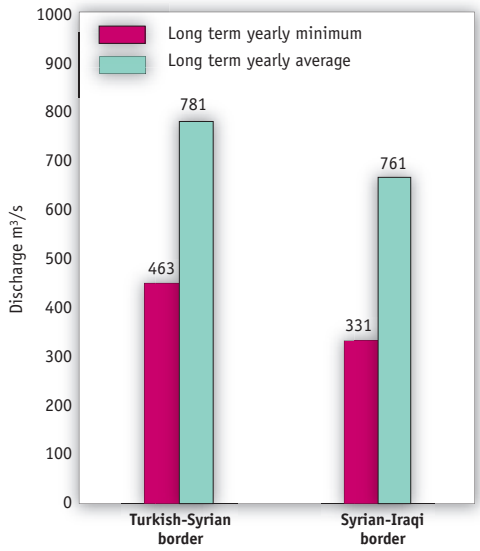
The river flow at the Turkish–Syrian border as well as at the Syrian–Iraqi border is as illustrated in *Figure 19* (based on the figures marked in yellow in *Table 7*). The estimated average flow of 781 m^3/s of the Euphrates River at the Turkish–Syrian border is higher than the existing

Table 7. Simulation statistics on selected main scenarios for the Euphrates River

All results are yearly average values, salinity concentration is flow-proportional. Flow restrictions in model: minimum flow at borders: T-S border = 450 m^3/s; S-I border = 58 per cent of T-S border. Minimum flow in south Iraq = 150 m^3/s. T= Turkey, S=Syria and I=Iraq.

Parameter	Scenario				
	Natural runoff/baseline	Full irrigation target		60% irrigation target	
		A1	A2	B1	B2
Assumptions/input data					
Minimum flow at T-S border (m^3/s)	-	450	450	450	450
Return-flow concentration (mg TDS/l)	-	700	3500	700	3500
Return-flow ratio (%)	-	20	20	20	20
Return salinity concentration in reservoirs (mg/l) (T/S/I)	-	300/400/500			
Net irrigation target (billion m^3/year)					
Turkey	-	10	10	6	6
Syria	-	10	10	6	6
Iraq	-	36	36	21.6	21.6
Net irrigation obtained (billion m^3/year)					
Turkey	-	9.2	9.2	6	6
Syria	-	9.4	9.4	6	6
Iraq	-	9.7	9.7	15.1	15.1
Flow at border (m^3/s)					
T-S border					
Average	1006	681	681	781	781
Min	493	450	450	463	463
S-I border					
Average	1091	467	467	671	671
Min	535	264	264	331	331
Calculated salinity concentrations at borders (mg TDS/l)					
T-S border					
Average	268	317	517	303	434
Min	330	369	623	352	533
S-I border					
Average	400	746	1395	573	906
Min	493	967	1841	753	1295

Figure 19. The Euphrates River: computed annual average discharge at the Turkish–Syrian border and Syrian–Iraqi border with reduced irrigation target values in the respective countries



agreement between Syria and Turkey, which is in "not less than of 500 m^3/s", although the absolute estimated minimum flow is lower (463 m^3/s). *Therefore, the 'agreed river flow' (of 500 m^3/s) and estimations (of 463 and 781 m^3/s) are not directly comparable.*

A critical question is to what extent the amount of irrigation (i.e. the concentration of the Return-flow from such areas) determines the salinity of the Euphrates River at the two relevant borders. In the following tables, two scenarios are presented: one with a majority fulfilment of the planned irrigation target (*Figure 20*): 9.2-9.4 billion m^3 *per year* and the other with 6 billion m^3 *per year* (60 per cent of the planned irrigation target in *Figure 21*).

The tables clearly show that the water quality has severely deteriorated for the downstream user as a consequence of full irrigation, especially in Turkey.

What has been presented is at best a summary of the study and may run the danger of oversimplification. A more comprehensive presentation of the results, including the full irrigation target, is however given in the relevant sections in the study. There is, nevertheless, another matter that must be discussed, which is related to the possible irreversible or permanent pollution of the reservoirs of the Euphrates unless drastic steps are taken. Perhaps one of the most alarming findings is the long-term effect of polluted reservoirs.

Since the results show that water quality is becoming a major challenge for the Euphrates Basin, the water quality analysis is outlined in more detail. As a consequence of large reservoir volumes in the Euphrates River basin, the average detention period[44] in the river has increased dramatically compared to the natural runoff.

Figure 20. Average salinity concentration of the Euphrates River at the Turkish–Syrian (T-S) border and at the Syrian–Iraqi (S-I) border versus return-flow concentration based on a 40-year simulation period with: net average annual irrigation extraction = 9.4 billion m^3 per year in Turkey and Syria. Return-flow ratio = 20% (ref. Scenario A1 and A2 in *Table 7*).

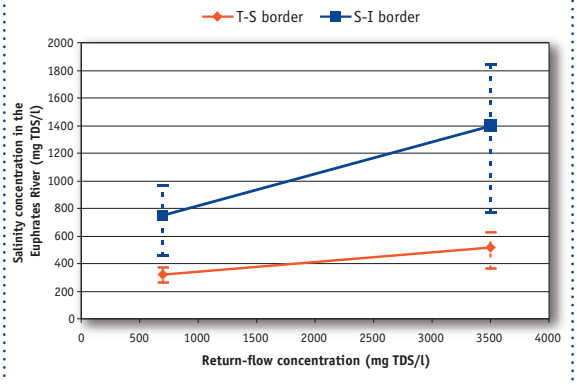


Figure 21. Average salinity concentration of the Euphrates River at the Turkish–Syrian (T-S) border and at the Syrian–Iraqi (S-I) border versus return-flow concentration based on a 40-year simulation period with: net annual irrigation extraction = 6 billion m^3 per year in both Turkey and Syria. Return-flow ratio = 20%. (Ref. Scenario B1 and B2 in *Table 7*)

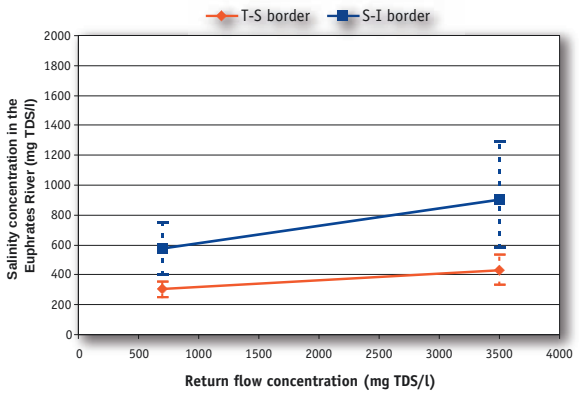


Figure 22 shows results from calculated salinity concentration in southern Iraq after irrigation extraction has been stopped (year 0). The salinity concentration should then gradually decrease to the natural-stage situation (where Return-flow from irrigation is not included).

Results show a reduction in salinity concentration in the Euphrates in southern Iraq after high irrigation/return-flow (until year 0) followed by no irrigation/return-flow. An assumed baseline salinity concentration in south Iraq is shown to illustrate how calculated salinity concentration will gradually be reduced to baseline concentration.

Perhaps one of the most alarming findings is the long-term effect of polluted reservoirs.

Based on the simulation results, if no irrigation takes place (i.e. no Return-flow), the following conclusions could be drawn:

- It will take about 1.5 years before the salinity concentration is reduced from approximately 1,250 mg TDS/l down to 600 mg TDS/l (halving).
- It will take about 7-8 years before the effect of highly-concentrated reservoir water is insignificant (close to the baseline situation).

Assessment of conveying Tigris water to the Euphrates River in Iraq

A *twin-basin model* involves the transfer of water from the Tigris to the Euphrates. One of the possible justifications of this model would be if the Euphrates River in the south of Iraq becomes polluted and inadequate for municipal usage and irrigation. In this case, the water from Tigris could be conveyed into the Euphrates to improve the water quality.

Since water quality data from the Tigris River was not made available for the study, only a rough and simplified assessment was carried out.[45]

Figure 22. Long-term effect of high salinity concentration in the Euphrates River Basin reservoir followed by complete stop in discharge

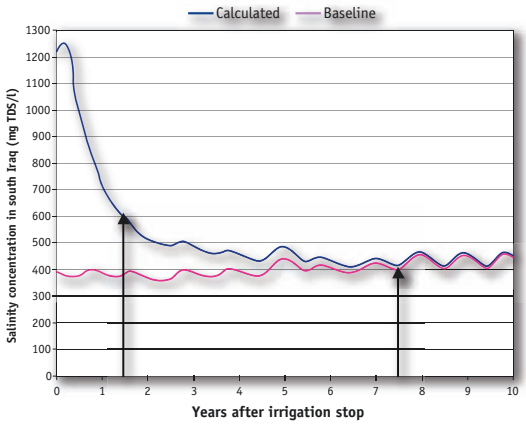


Photo 32.
The manmade drainage channel located between the Euphrates and Tigris Rivers in Iraq (1998)

The 'mixing' of waters from the Tigris with the Euphrates in Iraq in order to improve poor water quality downstream *might* have insignificant benefits. This does not, however, exclude the possibility of Syria and Turkey transfering water between the rivers if this is carried out as part of an agreement based on far more comprehensive modelling.[46]

Chapter 4

The findings and their relevance in developing solutions for sound river basin management

In this chapter, the separate-basin modelling of water quantity and water quality is summarized according to what is relevant in relation to a river basin management agreement. Only the most vital conclusions are outlined.

...special attention must be paid to the water quality aspects and particularly the impact of return-flow from irrigation.

Unexpectedly, the analyses have demonstrated that special attention must be paid to the water quality aspects in any water management strategy for each of the countries and particularly the impact of Return-flow from irrigation. In this respect, minimum and maximum river flow requirements at the borders between the three countries should be specified. Important key parameters, such as the contents of bacteria, metals, nutrients (phosphorus and nitrogen) and biota characteristics, were not made available. These parameters are, however, essential in performing an appropriate river basin assessment. There are reasons to assume that the situation might be even worse in terms of water quality.

Findings of the power production and water quantity simulations

With the separate-basin approach, the major findings indicated by the power and water quantity model simulations are summarized as follows:

The Euphrates River

- Increasing the minimum flow requirements at the border between Turkey and Syria from 300 m^3/s to 500 m^3/s will reduce energy generation in Turkey by approximately 1 per cent.
- Reducing the irrigation volume in Turkey from 10 billion m^3/year to 5.5 billion m^3/year will increase energy generation in Turkey by approximately 9 per cent (which could create a win-win situation for all three countries, except that Turkey may not fully use its irrigation potential).
- Full implementation of the irrigation schemes of the GAP project will reduce the longtime average discharge of the Euphrates River into Syria to approximately 650 m^3/s, equivalent to approximately 20 billion m^3/year as a long-term average value.
- It will be possible to maintain a minimum discharge of close to 500 m^3/s at the border between Turkey and Syria after full implementation of the GAP project.
- Full implementation of the planned irrigation schemes in Turkey and Syria will reduce the

long-term average discharge of the Euphrates River into Iraq to approximately 470 m^3/s, equivalent to approximately 15 billion m^3/year.
- The GAP region design irrigation volume of approximately 10 billion m^3 per year may not be the economically optimal irrigation volume. The calculations show a possible optimal irrigation volume of 6-9 billion m^3/year, even when environmental costs and interests downstream of the Turkish–Syrian border are excluded from the analysis.

The Tigris River

- Initial simulations carried out on the Tigris River indicate that it is possible to maintain a minimum discharge of 200 m^3/s at the border between Turkey and Syria–Iraq, after full development of the GAP project. As the calculations are not solely based on national data, they must be verified by the watercourse countries.

Findings of the water quality assessment: present situation

From the limited available data, the following water quality assessment of the *Euphrates River* has been made.

Irrigation

At present, the river is already saline, but the question is: *What is an acceptable level?* The findings present a situation which all countries must address:

- Salinity measured in Syria appears acceptable for irrigation use. However, long-term annual average data from north Iraq (Hussaiba) showed that in about 50 per cent of the measuring period (1976-1998), salinity was so high that the water quality should be classified with slight to moderate restrictions regarding irrigation use.
- Sulphate concentrations were relatively high compared to internationally recommended levels (50mg SO_4/l). The average recorded sulphate concentration during the measuring campaign was 80 mg/l.
- Relatively low oxygen saturation measured along the Euphrates River in Syria, with a decrease from north to south (from approximately 77 per cent in the north decreasing to 68 per cent) indicates significant biological activity. This may eventually restrict water use for irrigation purposes, especially if the origin is domestic emissions.

Drinking water

One may argue that it is unprecedented for an international river of this magnitude to attain drinking water standards. Some use the Rhine River in Europe, which is shared by eight countries, and is treated several times before it reaches the Atlantic Ocean, as a comparison. The Euphrates is, however, compared to similar international rivers, of relative high quality:

- All parameters are typically above guideline values (especially sulphate concentration) but below the maximum permissible values, except for magnesium, where the maximum recorded values exceed the maximum recommended values.[47]

Water quality simulations

As described, water quality modelling has only been executed on the Euphrates River. The following findings are thought to be important regarding development of any river basin management strategy:

- Based on the assessment of the present water quality and the simulation results, it is recommended that a cautious strategy be chosen for implementing the planned irrigation schemes in the watercourse countries.

- The simulation modelling showed that with full irrigation targets (as stated by the upstream countries) the water quality will most likely not conform to user requirements. It is therefore recommended that an irrigation strategy implying less than 60 per cent of the full irrigation target be put into practice.
- If net target irrigation volumes are put into practice, a strict rule curve[48] operation must be applied; that is to say, as the volumes of water in the reservoirs are reduced, the permissible extraction of water for irrigation purposes must be reduced accordingly.
- Without a rule-curve regime, high peak salinity concentration will occur in dry years, resulting in a water quality not suitable for irrigation purposes. In practice, it is also an advantage to operate along a rule-curve regime in order to ensure that reservoirs are not emptied during dry seasons.
- Even with the rule-curve regime applied in the technical study, a critical worsening of the water quality occurred when the full irrigation extraction target was simulated, especially during dry years. Analyses of accumulated high salinity in the Euphrates and its reservoirs showed that restoring the water quality back to an acceptable level is a slowly reversible process, even if all discharges are stopped (which in itself is a highly theoretical assumption, and in reality probably not possible).
- A conceptual assessment of conveying Tigris water into the Euphrates River in Iraq to improve on poor water quality showed that under the assumed prevailing conditions this measure has a limited effect downstream. Further studies are necessary to determine this result.

Since irrigation must be reduced in relation to the Parties' ambitions, should the twin-basin model be adopted rather than the separate-basin model?

In order to compensate for the reduced irrigation and need to manage water quality, a possible transfer of Tigris water into the Euphrates Basin should be evaluated for Turkey. An analogous measure should be assessed for Syria, although in both cases as part of an agreement. On this basis, one may argue that the two rivers should be viewed as a twin basin (as Turkey argues).

One should not, however, hide the fact that from a negotiating point of view a twin-basin model seems complex to negotiate. This is because operation of the rule-curves of the rivers would be quite complex: if transfer of water within Syria and Turkey takes place between the two rivers, it must be co-ordinated by all three countries and included in an agreement.

Another relevant question is: to what extent are these findings valid, and how applicable are the results for future trilateral water agreements?

In order to verify and review the results of the study, an independent review was conducted by an international scientific institution and a leading international water scientist.

Third Party review of the technical study

It is obvious that with any technical water management study, and especially when simulations and models are included, the results are not carved in stone. The data, methods and assessments may be put into question. This technical study is by no means an exception; especially because it deals only with the separate-basin model and not the twin-basin one.

Photo 33.
Water-level measurement sticks in the Euphrates River

It therefore seems evident that the technical findings cannot be exactly applied in a trilateral agreement – there are simply too many prerequisites set out in the study. Even more importantly, any agreement would have to be developed within a political context rather than in a confined scientific one.

The results nevertheless give a technical basis for any future deliberations. It therefore became evident that an external review of the study would either decease or increase the legitimacy of the results. Two independent reviews were thus conducted: a limited one by the British scientist J. A. Allan of the University of London's School of Oriental Studies, and a more comprehensive one by the renowned Swiss Federal Institute for Environmental Science and Technology (EAWAG).

Allan acknowledges that "[t]he study provides by far the most comprehensive account of the hydrology of the Tigris–Euphrates river systems so far assembled". He summarized the whole report by stating:

> "The [technical study] is an important potential contribution to advancing agreement over the allocation of the Euphrates-Tigris riparians and their future quality. It could have an immediate impact as an input to technical discussions on water allocation and the management of water quality. Such discussions are essential."[49]

Subsequently, in early 2003, the EAWAG in Zurich[50] conducted a more detailed review of the study. The institute put together a team of water experts who answered a set of critical questions on it.[51] The specific questions and relevant answers are outlined in the technical study. EAWAG's overall conclusions were:

> "In general, EAWAG is very positive about the analyses in the CESAR report with a view that it should serve as a *'start up document' to facilitate negotiations*

Photo 34.
Monitoring of water quantity and quality as part of the compensation mechanism should go beyond today's situation

> [my emphasis]. It is certainly recogni[z]ed that the study is unique, since no similar studies have been carried out. It should indeed be of the interest to the Parties to use the study as a *basis for negotiations to obtain a long-term sustainable solution*" [my emphasis].

It seems obvious from EAWAG's review that exact figures from the study should not be directly applied in any trilateral agreements. Their univocal recommendation is to use the *findings* as a critical input to further studies, in preparing realistic positions of the Parties, and for the political negotiations. This is exactly the author's purpose with this publication.

One of the strongest recommendations from EAWAG is that the three Parties should work together in developing further river basin studies in order to understand the exact nature of how the rivers may be optimally used, both in terms of quantity and quality.

Water quality aspects in existing treaties

As outlined in the introductory part of this book, the University of Oregon was commissioned to conduct a study on the extent to which water quality aspects were included in international water agreements.[52]

The new generation of water agreements and standards, such as the UN Convention of Non-Navigational Use of International Watercourses and the EU Framework Directive on Water, contain references to protection of water quality. The EU Framework includes very strict water quality standards and monitoring procedures. Today, the Directive goes far beyond any existing water standards set in the Middle East. In any case, the inclusion of water quality and monitoring in any agreements on the Euphrates and the Tigris Rivers is legitimized by a strong international trend (see also Iza, 2004).

Photo 35.
A railroad bridge with a water-measurement device over the Balih River on the Syrian side of the border with Turkey

Chapter 5

Two alternative models for a trilateral water agreement on the Euphrates and the Tigris Rivers

All three countries have officially and unofficially expressed a need for a trilateral water agreement. None of them will, however, enter into any agreement if the benefits do not outweigh the costs, either in terms of political and financial capital, or from a more technical water management point of view. When the *realpolitik* conditions will be optimal for an agreement is hard to predict, if not impossible. Each country, as well as other stakeholders, has its own perception of the right timing, and it is in the midst of this uncertainty that the following principles for a possible water agreement are made public.

Whether the conditions are optimal or not when this book is made public is not for the author to judge. Rather, the aim is to offer a proposal that might be considered an input *when* the three countries are ripe to enter into negotiations for an agreement. This proposal is a reaction to an imperative and urgent need for a trilateral water agreement, irrespective of the ebb and flow of politics.

This proposal is a reaction to an imperative and urgent need for a trilateral water agreement, irrespective of the ebb and flow of politics.

To reach such an agreement requires, first and foremost, political will from each of the countries. It is fruitless to blame any of the countries for not promoting the necessary co-operative willingness. Instead, before outlining a preliminary water agreement, it seems relevant to illustrate the advantages of co-operation as set out by Turkish water expert Altinbilek (2004).

Advantages of co-operative actions

- "The optimum plan for the basin as a whole can be formulated and implemented.
- Seemingly conflicting demands can be harmonized within a broad master plan that may incorporate many water-supply-augmenting and efficiency-improving measures.
- The waters for the Euphrates and Tigris can be utilized equitably and effectively, taking into account seasonal and yearly variations in flow due to floods and droughts.
- Joint regional research institutions, training centres and pilot farms …
- Water-augmenting techniques …
- Co-operative action may facilitate the achievement of environmental sustainability.
- Financing of joint and national projects from various international sources may be easier and more attractive".

Source: Altinbilek, 2004.

Altinbilek is proposing the transfer of water between the two rivers and between the reservoirs of the same river or two rivers.[53] At the same time, he adds the danger of politicizing the water issues to such an extent that they "may be heavily obstructed by inclusion of other issues and controversies".

As discussed in the preceding chapter, a key question is the extent to which the technical findings form the basis for a negotiated political trilateral water agreement. Before answering that question directly, some factual issues must univocally be considered when such an agreement is developed:

- It is urgent that a trilateral water agreement be reached as soon as possible, irrespective of whether a separate-basin or twin-basin model is chosen. If not, and if no remedial action is taken, irreversible damage, especially to the Euphrates watercourse in the lower part of Syria and in Iraq, may occur as irrigation volumes are increasing.
- In order to prevent the Euphrates River from being polluted – especially in dry periods – the application of rule-curves for extraction of water for irrigation is recommended. Discharge values at the Turkish–Syrian and Syrian–Iraqi borders might therefore vary, and even more so if climatic changes increase.
- The consequences of doing nothing on the above-mentioned points would be severe human suffering.
- An allocation of water quantity to each country must be determined by the need to maintain a minimum water quality for the users of both watercourses. The exact minimum discharge, which is technically suggested to be of 150 m^3/s (for the Euphrates River at the point of convergence with the Tigris River in southern Iraq), may be discussed. However, the independent review by EAWAG[54] underlines the importance of minimum flows and concludes that an amount of 150 m^3/s might be sustainable. An agreement on this amount is not insignificant for determining the effects upstream.
- A precautionary principle should be applied for the planned irrigation schemes in the watercourse countries in order to maintain sustainable development of the river basins.
- A water quantity and quality monitoring programme should be implemented at the borders. A set of limiting value ranges for these parameters should be established.
- Transfer of sound environmental wastewater technology and joint research on development of low water demand crops and effective irrigation practices should also be intensified.

The three countries should also adhere to some general principles that would increase the sustainability of any solution:

- From a sustainable water management perspective, it is not conclusive whether there are two associated agreements for the rivers or one unified one, as long as an agreement is reached on how to manage the rivers for the optimal benefit of all three countries. From a negotiation process point of view, however, it seems appropriate to develop a single agreement, or at least two linked river agreements.
- Turkey has argued that the river basins should be treated as a single basin: the so-called twin-basin model. However, it is unclear whether this means that there should be a single agreement. The technical study has shown that in case the rivers are treated as one basin, transfer of water between them (at least in Turkey and Syria) without coordination with the downstream countries should be carefully assessed. Such a twin-basin approach is feasible, but seems

more complex to negotiate and even more complex to operate at an international level (through rule-curves).
- All three countries have, as a principle, acknowledged the responsibility to protect and use the watercourses in an equitable and reasonable manner.
- All irrigation projects in the watercourses should be made subject to an extensive environmental impact assessment with respect to Return-flow, soil and groundwater effects.

Based on these principles, the two above-mentioned models are presented: a twin-basin model; and a separate-basin model as a basis for possible trilateral water agreements. Irrespective of the models, the common elements outlined earlier are included in the text as outlined in *Annexes 4* and *5*.

The allocation of water and water quality standards at the borders with either a *twin-basin* or a *separate-basin* model

A decision of the three countries to pursue either a twin-basin model or the separate-basin model will determine how the rivers are to be managed, i.e. the rule-curves (how to co-ordinate the various usages as such as hydropower, irrigation, storage and extraction of water).

As of today, relevant information is only available for the separate-basin model, which means operating the rivers separately (cf. the technical study). However, based on the experience gained from the study, it would be intellectually arrogant and politically unwise not to also consider a twin-basin model, since the findings of such a study are as yet unknown. Several studies must be conducted in order to find a complex but feasible formula that aims primarily to meet the following objectives:

- optimize water usage in Turkey;
- provide predictable and co-ordinated minimum flows of both rivers to Syria;
- optimize water usage in Syria;
- provide predictable and co-ordinated minimum flows of both rivers to Iraq; and
- provide predictable and co-ordinated minimum flows of both rivers enabling Iraq to optimize its water usage also.

In addition to this, with a twin-basin approach water quality standards must be developed based on water quality models for both rivers. Below, some principles for an international allocation formula between them are presented.

Principles relevant for determining water use and water allocation *in a twin-basin* model:

- Indicative water allocation values must have combined and separate suggestions for both rivers.
- To prevent both watercourses being polluted, especially in the dry periods, associated rule curves for the two rivers for the extraction of water for irrigation purposes should be applied. The rule curves shall be revised according to the results of a periodic rule-curve evaluation.
- The watercourse countries shall jointly strive to maintain an absolute minimum discharge and expected maximum long term average (m^3/s) at the Turkish–Syrian and Syrian–Iraqi borders.
- The maximum permissible water quality values at the Turkish–Syrian and Syrian–Iraqi borders must be accepted by the watercourse countries as normal values that do not require specific action to be stated.
- If any of the value ranges reported show a total change of a certain percentage over two successive periods, the watercourse countries

shall investigate the cause of the changes and report on this to a Regional Water Management Organization (RWMO), which may invoke mitigating actions.

Photo 36.
Monsul Dam on the Tigris River in Iraq

Based on the findings from the technical study, indicative water allocation and water quality requirements on the borders between the three countries (as outlined at the end of *Annex 5*) should be considered. *However, these figures are illustrations rather than than actual negotiable numbers. More modelling is certainly necessary in order to understand the implications of any chosen formula*.

In addition, likely climate change demands that the countries determine allocation figures on the basis of criteria such as natural rainfall over a certain period – and revise these threshold values on a regular basis.

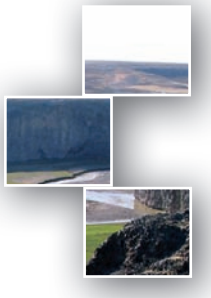
In summary, as an illustration, approximate water allocation for the Euphrates may be around (with an agreed threshold value): 7 billion m^3/year for Turkey, 7 for Syria, and 13 for Iraq.

Approximate yearly values of discharge of the Euphrates River may be around:

- an absolute minimum of 450 m^3/s at the Turkish–Syrian border, with an expected long-term average of 750 m^3/s;
- an absolute minimum of 450 m^3/s at the Syrian–Iraqi border, with an expected long-term average of 550 m^3/s; and
- an absolute minimum of 150 m^3/s at the convergence point with the Tigris River, with an expected long-term average of 150 m^3/s.

The data for the Tigris River is too uncertain to provide illustrative figures at this stage.

Irrespective of whether the twin-basin or separate-basin model is chosen, the water quality of the rivers must be managed in one way or another. The following chapter suggests one way of handling this matter.



Chapter 6

Mitigating cross-border pollution through a third party compensation mechanism

Raison d'être

The results of the technical study make it quite clear that the water quality aspects – especially for the Euphrates River of today and in the near future – must be given special attention in any basin management strategy, and particularly the impact of Return-flow from irrigation.[V]

In order to avert negative environmental and subsequent humanitarian consequences of a situation that may be described as a crisis[VI], there is a need for concerted measures to reduce the expected adverse impacts of intensified and expanded irrigation.[55]

In order to adequately address these impacts by maintaining a certain water quality level according to agreed standards, a third party compensation mechanism is proposed, in the first stage, at the border of Syria and Iraq. Later, similar plants would be located in the border areas of Turkey and Syria. Such a compensation mechanism demands funds that, realistically speaking, can be raised only by the international community. There are two reasons for this:

1. The amount of funds necessary to mitigate the pollution is so large that only a multi-donor effort can meet the financial requirements.
2. Stakeholders outside the region might consider this compensation mechanism effective in preventing unstable conditions that could stem from such a crisis.

Objective

A compensation mechanism would aim to achieve internationally accepted water quality standards and thereby minimize the negative effects of poor water quality on the sustainable development projects of the watercourse countries. The first priority should be given to the Euphrates River. This would take into account and reconcile four key and potentially conflicting objectives:

- Turkey's *planned agricultural use* in the South Anatolia region (GAP);
- Syria's demand for expansion of irrigation;
- Iraq's long term claim of *access to usable water*; and
- the need to sustain the ecological balance of the rivers.

The most effective way of mitigating pollution of the Euphrates, and especially salinity, is to propose that the compensation mechanism

V A primary concern for the management of irrigation is the discharge of salts, pesticides and nutrients tow groundwater and discharge of these pollutants plus sediment to surface water. The goal of mitigating management measures is to reduce the movement of pollutants from land into ground or surface water from the practice of irrigation.

VI Such a crisis would probably first take place in the lower part of the river basin, i.e. affecting Iraq.

compensate Syria for upstream measures to reduce the pollution of the water flowing into Iraq. In addition, and as a next step, the same mechanism could be implemented on the Turkish side at the Turkish–Syrian border in order to achieve acceptable water quality (especially along the drainage areas at the border zone).

An implementation, monitoring and verification system should be an integral part of such a compensation mechanism.

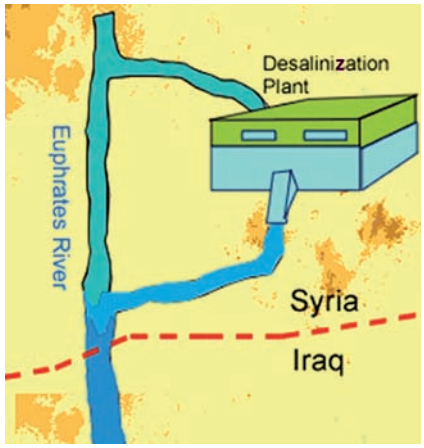
More specifically, third party institutions such as the World Bank or United Nations, or combinations such as the 'Global Environmental Facility' (GEF)[56], Kuwaiti Fund, European Bank for Reconstruction and Development, European Investment Fund, and other countries and groups such as the US, Russia and the EU respectively should offer to cover the incremental costs of a scheme for mitigating pollution in order to achieve agreed-on water quality standards.

Establishment of a desalinization plant

Economic compensation would be used to reduce the negative downstream effects, which could in the first instance include a desalinization plant at the Euphrates River on the Syrian side of the Syrian-Iraqi border.[VII]

Such compensation would also be given to Turkey in the GAP region to undertake measures that aim to reduce the negative pollution effects downstream, through efficient application and transport of irrigation water and management of drainage water.

Figure 23. Desalinization plant for the Euphrates River



Internationally, there are parallels to such a mechanism, such as the US and Mexico agreement on the Colorado River, where a desalinization plant installed on the US side treats water in order to maintain agreed water quality standards.[57]

Why should the international community fund a compensation mechanism?

One may argue that national water usage for sustainable development should be governed through the respective country's water management legislation. In most cases, however, as in the Euphrates and Tigris basins, national legislations are currently neither harmonized nor reflect international water quality standards.

It is well understood that unrestricted water use upstream would impose environmental and thereby economic burdens on downstream states. At the present time, improving downstream water quality and quantity to minimize adverse

VII In order to remove any doubt, it is important to underline that there is neither an explicit nor implicit burden put on Syria regarding pollution of the Euphrates. The location of the plant is solely chosen in order to optimize the water efficiency of such a measure. The establishment of the plant aims to assist all three countries in fulfilling their obligation to maintain a certain water quality.

Photo 37.
The Murat River close to Lake Van, part of the Euphrates Basin in Eastern Turkey

impacts will place additional cost on upstream users. Over the past decade, this has been internationally recognized, as shown by the establishment of the joint World Bank/UNEP/UNDP Global Environmental Facility. One of its four prime objectives is to cover such additional costs related to international watercourses.[58]

It appears obvious that the challenges to sound management of the two rivers fall within the mandate of the GEF, which is a recognition of the responsibility of the international community to provide additional compensation to upstream countries adopting mitigation measures. Otherwise, the *overall cost* for the concerned national governments, as well as for the international community, is likely to be many times higher in terms of unintended humanitarian, economic, social and environmental consequences as well as potential instability in the region.

In line with such reasoning, the mechanism could be one of the first joint projects under the new proposed Euphrates and Tigris Basins Initiative.

What kind of costs should the third party compensation mechanism cover?

The mechanism might cover the cost difference between what the national water management practice and legislation would require, and what the internationally accepted water quality standards would require.[59]

These additional costs are calculated as Syria and Turkey's real capital, operation, maintenance and agreed opportunity costs of water resource management that guarantee maintaining a certain *water quality level for uses downstream*. Exactly what incremental costs may be considered should be estimated in a separate study as an input into a negotiated compensation mechanism. The compensation could be used by Syria to build a desalinization plant at the Syrian–Iraqi border as well as to develop programmes to enhance

water efficiency and mitigate water pollution, especially from irrigation.

Similarly, the compensation to Turkey should also enhance water efficiency and mitigate its water pollution, especially from irrigation that drains across the border into Syria.

Compensation principles

The compensation mechanism briefly outlined above relies on at least five assumptions:

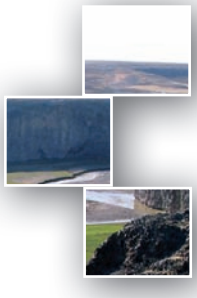
1. Compensation for foregone water usage should be developed.
2. Agreement on accepted water quality standards at the Syrian–Iraqi border.[VIII]
3. Agreement on accepted water quality standards at particular border areas on the Turkish–Syrian border.[IX]
4. Agreement on the principle that only incremental (additional) costs in Syria and Turkey due to the agreement will be admissible. This implies that compensation for investments in water resource management infrastructure, which is not a consequence of such an agreement, will not be given to either of the Parties.
5. Agreement that actual incremental costs will be calculated using the most cost-effective water resource management options available, relative to the agreed standards that guarantee Syrian and Iraqi water resource uses.

As illustrated above, several questions must be answered before such a compensation mechanism can be established, some of which can only be solved through a trilateral negotiated process.

As discussed, one may argue that the three countries should first negotiate a trilateral agreement based on specific principles in terms of water allocation and water quality standards. In order to implement such an agreement, however, a parallel process should deal with the compensation mechanism in order to ensure that any trilateral agreement reached is feasible.

VIII Without agreement on such standards, there is no basis for calculating the incremental costs for the desalinization plant as well as water pollution in general.

IX Similarly, without agreement on such standards there is no basis for calculating the incremental costs of reducing the return-flow from irrigation.



Chapter 7

Establishment of a Euphrates and Tigris Basin initiative

There is a univocal conclusion that co-operative management of the Euphrates and Tigris Rivers must be improved in the future. If this is not achieved, the water resources will not only be insufficient for the countries to provide 'water for the people' in terms of quality and quantity, but equally importantly, they may be irreversibly deteriorated.

This part of the publication has attempted not only to document this conclusion, but also suggest ways of overcoming the problems. Neither is easy.

However, reluctance to deal with these challenges at this early stage among the respective countries and international community will eventually multiply the problems beyond the reach of remedial action.

It is therefore the author's obligation to urge Turkey, Syria and Iraq to take action now. Without action, the problems will continue to grow, with tragic consequences for the people of these countries and possibly for others outside the region.

In addition to sitting around the negotiation table, Turkey, Syria and Iraq should probably take three immediate and concrete steps:

1. Conduct a comprehensive twin-basin modelling and compare it with the so-far studied separate-basin model in order to improve the factual basis for further actions.
2. Begin to develop a third party compensation mechanism.
3. Jointly agree that a Euphrates and Tigris Basins Initiative should be established to address the immediate and long-term water management challenges (see the following description).

This third bold step is required as the first two actions are far from sufficient in the short and long-term. Indeed, complicating political developments may even gridlock co-operation on water.

A new international initiative for the Euphrates and the Tigris River Basins

Regardless of set political changes with geopolitical implications such as in Iraq, it seems obvious that a *new overarching international initiative* must be taken so that the two rivers do not become 'rivers of fire', and instead become a true blessing for the people and lands in the region.

...a new overarching international initiative must be taken so that the two rivers do not become 'rivers of fire',...

The Euphrates and Tigris Basins Initiative (ETI) could be a partnership initiated and led by the riparian states of the two rivers through a Council of Ministers with the full support of the international community, through an international organization such as the Arab development banks and institutions together with, for example, the World Bank (in association with GEF and the UN).

...the notion of 'benefit sharing' has been introduced to international rivers, in the sense that riparian states should share benefits rather than water itself.

Similarly to the Nile Basin Initiative (NBI)[60], which encompasses nine riparian African states, it could start with a participatory process of dialogue among the riparians that should result in agreeing on a shared vision, for example "achieving sustainable socioeconomic development through the equitable utilization of, and benefit from, the common Euphrates and the Tigris Basins water resources" (cf. the similarity with the NBI). This vision could then be translated into a programme similar to the NBI Strategic Action Program, with concrete activities and projects.[61]

A Strategic Action Programme of the ETI could be made up of two complementary programmes:

1. A basin-wide shared vision programme (SVP) to build confidence and capacity across the basins.
2. Sub-basin subsidiary action programmes (SAPs) to initiate concrete investments separately or jointly for the two rivers.

The two programmes would reinforce each other. Indeed, the SVP focuses on building regional institutions, capacity and trust, laying the foundation for unlocking the development potential of the Euphrates and the Tigris basins, which can be achieved through the SAPs.

Sharing benefits

It is quite obvious that the potential of co-operation of the Euphrates and the Tigris Rivers is still largely untapped. The abovementioned remedies of curbing pollution and optimizing use of the water flow are significant and urgent, but the potential of enhanced benefits for all countries is huge. More recently, the notion of 'benefit sharing' has been introduced to international rivers, in the sense that riparian states should share benefits rather than water itself.

A gap exists between the academic notion and realities on the ground, but there is of course no doubt that the three countries could have improved the sharing of benefits, such as by:

- optimizing hydropower production in relation to irrigation;
- optimizing the use of water for agricultural purposes – where that should be done in relation to favourable natural conditions;
- optimizing water for agricultural purposes to reduce pollution (i.e., reducing the Return-flow with high salt content, pesticides and fertilizers); and
- developing electricity trading (including hydropower) that could also encompass joint investment in hydropower plants and power infrastructure.

One may argue that such an initiative is unrealistic and even counterproductive, as attention will be taken away from today's pressing problems and precious time lost. Those arguments were also used against the over ten-year-old NBI in Africa. Today, the NBI has achieved remarkable

progress, and it is likely that all nine countries will shortly sign a framework water agreement for the Nile Basin. Equally importantly, several concrete water management projects (under SAP) are being prepared and implemented for national and international benefits.

Establishment of an 'ETI Trust Fund'

A Euphrates and Tigris Basins Initiative should be supported by each of the riparian states, but equally importantly, by a number of bilateral and multilateral development partners.

An ETI-Trust Fund (ETI-TF) could be a funding mechanism to help administer and harmonize donor partner support pledged to the ETI. The Arab Banks and/or World Bank could, for example, administer the ETI-TF on behalf of contributing donors in accordance with the ETI-TF Agreement and the Arab Bank/World Bank's Trust Fund Policy and Procedures.

An ETI-TF could support the preparation and implementation of ETI programmes, including the basin-wide shared vision programme (SVP) and sub-basin investment programme, called for example the Euphrates Basin Subsidiary Action Programme (EBSAP) and Tigris Basin Subsidiary Action Programme (TBSAP). At the basin-wide level, the ETI-TF could also support the process of ETI dialogue and engagement as well as efforts to strengthen the capacity of planned ETI institutions. At the sub-basin level, ETI-TF could support the preparation and implementation of joint investment projects.

ETI-TF funds would then be transferred to the ETI, which would have primary responsibility for the implementation of project activities. Almost all of the ETI-TF-financed projects should be recipient-executed. This would help ensure ownership of ETI activities and contribute to building institutional capacity to implement regional projects. As progress is made in programme implementation and a permanent institutional framework for the ETI is agreed on, the ETI-TF would be transferred to an ETI institution.

As the ETI-TF administrator, the Arab Banks and/or World Bank could be responsible for fiduciary management of pooled multi-donor resources and for preparing and supervising ETI-TF-financed projects in accordance with the Banks' rules and procedures.

In addition, an ETI-TF Committee could be responsible for overseeing the operation of the trust fund and for ensuring that resources used meet ETI programme objectives. This committee would be comprised of representatives from contributing agencies, the ETI and the Arab Banks and/or World Bank.

Concluding remarks

With reference to the water management study of the Euphrates and Tigris Rivers, a univocal conclusion is that co-operative management of the Euphrates and Tigris Rivers must be improved in the future. This part of the publication has attempted to document this conclusion, but even more importantly provide suggested ways out of the problems. Neither of them is easy.

This book is quite adamant on one point: Reluctance to deal with these challenges at this early stage among the respective countries and

Reluctance to deal with these challenges at this early stage among the respective countries and international community will eventually multiply problems beyond the reach of realistic remedial action.

international community will eventually multiply problems beyond the reach of realistic remedial action.

The author strongly urges Turkey, Syria and Iraq to take action now. Without action, the problems will continue to grow, with tragic consequences for the people of these countries and possibly for others outside the region.

Equally importantly, the author notes that the countries, together with the international community, should take the necessary steps to establish a Euphrates and Tigris Basins Initiative that would provide support for *action in the foreseeable future*.

Having had the privilege of knowing many wise key decision makers and knowledgeable experts in the three countries, I am optimistic that they will soon take the necessary steps.

Endnotes

1 See for example *Annex I*: Selected international literature regarding the Euphrates and Tigris Rivers.

2 As stated by Humam Misconi, a Ministry Adviser of Public Works as reported by *Baghdad Mirror*, 2 May 2005 by Rick Jervis (quoted from USA Today).

3 Before the study, one of the very few international scientists that pointed to the international environmental implications of GAP on Syria was Professor Peter Beaumont (Beamont, 1996).

4 Also confirmed by the newly released report on Iraqi living conditions from UNDP (2005).

5 Conveyed by a high official at the Ministry of Irrigation in Iraq to the author in 1999.

6 The establishment (and not the operation) of three stations were funded by the Norwegian Government and implemented by the CESAR Foundation, while the one in Iraq was funded by CESAR itself.

7 Especially related to the relationship between water flow and quality at the Syria-Turkey and Syria-Iraq borders.

8 Also called 'non-evident water': "Invisible or non-evident water is soil water and water embedded in commodities which require water for their production. For example a tonne of grain requires 1000 tonnes (m^3) of water to produce it." (Allan, 2002: 336).

9 Such as considering water as an economic good; this may seem contrary to Islamic Law (*Sharia*) for some.

10 See *Annex 1*, and especially a renowned publication by Kolars and Mitchell on *The Euphrates River and the South East Anatolia Development Project* (Kolars and Mitchell, 1991).

11 According to the original documents submitted to the three countries, cf. CESAR (2005) at http://www.cesar.no/

12 As the Chairman of the CESAR Foundation based in Oslo, which carried out the technical studies.

13 A technical study was developed; see CESAR (2005).

14 The Turkish positions are outlined in Turkish Ministry of Foreign Affairs (1996) and SAM (1996). For the specific quotes in the text, see SAM (1996: 18).

15 The only place where the rivers form the borders is the Tigris between Turkey and Syria for a stretch of 62 kilometres, just before it reaches the Turkish, Syrian and Iraqi cross point.

16 Just north of Baghdad – which connects the two rivers.

17 This argument is particularly aimed at Iraq as Turkey argues, "This means that some Iraqi land irrigated from the Euphrates can also be irrigated from the Tigris" (SAM, 1996: 22).

18 By stating, "Therefore, it will not only be uneconomical but will also be inequitable to utilize scarce water resources to irrigate infertile lands at the expense of fertile lands", in Turkish Ministry of Foreign Affairs (1996: 7).

19 The Three Stages Plan consists, among other things, of the following elements:

- "Stage 1 – Inventory Studies for Water Resources
  Experts from the riparian States shall exchange full data sets from selected gauging stations in the river basin on:
  - meteorological data
  - hydrological information; and
  - standardisation of measuring techniques
- Stage 2 – Inventory Studies for Land Resources
  To exchange information for all projects in operation, planned or under construction, in all the three riparian States on:
  - soil classifications and conditions
  - drainage criteria and practices
  - crop-pattern determined to soil classifications; and irrigation and leaching water requirements.
- Stage 3 – Evaluation of Water and Land Resources
  Experts from the three countries will evaluate the following:
  - Determine irrigation type and system for the planned projects aiming at minimising water losses.
  - Determine the total water consumption for all the projects in each of the three countries (including evaporation losses, leakages, etc.).
  - Setting up a simulation model to analyse the demand and supply situation in the river basin … considering water transfer from the Tigris to the Euphrates River.
  - Methods and criteria determining economic viability of the planned projects in the three riparian States.

  After the gathering of relevant data, the Joint Technical Committee (JTC) will calculate the water demands for projects under operation, for projects under construction and for planned projects. Determination of these projects will be made separately" (Turkish Ministry of Foreign Affairs, 1996).

20 Specifically stated by several Syrian Government Ministers to the author. See also Daoudy (2005b).
21 Cf. the UN Framework Convention on the Law of Non-Navigational Uses of International Watercourses.
22 Cf. open sources such as http://www.syrianagriculture.org/
23 According to unpublished Syrian documentation from the Ministry of Agriculture as well as from the FAO dating back as far as 1994 (FAO, 1994: 161-167).
24 Communicated to the author by various Syrian Ministers for Irrigation and by the political leadership of the Ministry of Foreign Affairs.
25 As well as upstream of Turkey, just before the Orontes River reaches the Mediterranean Sea in the disputed Alexandretta region (claimed by Syria): This is Syria's argument to counter the abovementioned Turkish statement that the way Syria is utilizing the Orontes has implications for the way Euphrates shall be managed.
26 Cf. the UN Framework Convention on the Law of Non-Navigational Uses of International Watercourses.
27 Communicated repeatedly to the author by various Iraqi Ministers of Irrigation and officials from the Iraqi Ministry of Foreign Affairs. See also Iraq Ministry of Foreign Affairs, 1999.
28 The water quality problems in Iraq are severe, as documented in UNDP's report on Sources of Potable Water (UNDP, 2005):
- 78% of families are connected to the water network, 88% in the urban areas and 43% in the rural areas.
- 39% of families in Iraq suffer from instability of supply of potable water.

29 See: http://www.cesar.no/Selected_publication/Selected_publication.htm
30 *Ibid*.
31 *Ibid*.
32 EIE (Elektrik İşleri Etüt). General Directorate of Electrical Power Resources Survey and Development Administration. http://www.eie.gov.tr/
33 See, for example, reports of the British NGO Oxfam and the international Red Cross/Red Crescent.
34 Consultations with Iraqi officials plus documentation provided.
35 As reported in the US State Department's press briefing regarding information on Iraq, *The Madrid Donors' Conference: Helping the Iraqi People Build a New Iraq* (cf. http://www.state.gov/p/nea/ci/c3212.htm) on 6 November 2003. State Department information on Iraq.
36 Personal communication with Iraqi officials from the Ministry of Water Resources in the fall of 2004 and in July 2005.
37 As no national data was made available regarding power tariffs and crop value, a specially designed analytical framework and data set was applied to identify the optimal irrigation strategy, based on economic considerations.
38 The following specific conclusions were drawn in the technical study:
- "The GAP-region design irrigation volume of approximately 10 billion m^3 per year may not be the economically optimal irrigation volume for Turkey. The calculations show a possible optimal irrigation volume of 6-9 billion m^3 per year when environmental costs and interests downstream of the Turkish–Syrian border are excluded from the analysis. These numbers will become considerably less when such interests are considered – probably in the range 2-7 billion m^3/year.
- A reduced irrigation volume will reduce possible negative impacts on environment and public health, especially for Syria.
- The loss of net benefits (to Turkey alone) due to maintaining a minimum flow of the Euphrates at the Turkish–Syrian border, may be considered small compared to the benefits accruing to downstream countries."

39 This section presents some selected data made available by the three countries: data publicly available, and derived data used in the model computations of power production and river discharge.
40 For the model simulations, the period chosen for analysis is 1938–1977 for the following reasons: i) data available for a 40-year period, ii) end of the simulations in a year with approximately the same runoff as the first year of analysis; and iii) inclusion of two dry cycles, 1958–1962 and 1972–1975. The figures over the forty-year period have a high correlation between the various measuring points as well as the different sources (of documentation).
41 These estimates are based on several parameters related to: data on reservoirs and hydropower stations, evaporation, reservoir capacity curves, water demand for irrigation, and assumed natural yearly average model runoff.
42 VANSIMTAP for power production and discharge in Turkey on the Euphrates River and the Tigris River, and MIKE BASIN for river discharge in Syria and into Iraq on the Euphrates River.

43 Council Directive 98/83/EC of 3 November 1998 was applied on the quality of water intended for human consumption (maximum values not to be exceeded). In addition, Council Directive 80/778/EC was applied for recommended guideline values. Many sources were examined regarding standards for water quality for irrigation purposes. Most sources make reference to the Food and Agriculture Organization of the United Nations (FAO) such as FAO (1995) on "Water quality for agriculture". The following sources and stated required water quality for agriculture irrigation in USA, Canada and Australia were also applied: CWOG (1987), NAS/NAE (1973) and Hart (1984).

44 The time of the flow-through of the water.

45 It was revealed that even with a constant conveyance of 200 m^3/s of water from the Tigris with a salinity concentration of 300 mg TDS/l, the concentration in the Euphrates River is reduced by only approximately 20 per cent. In practice, the available long-term average volume of water from the Tigris River will be less than 200 m^3/s and the salinity likely higher than 300 mg TDS/l.

46 Such actions would have to be co-ordinated with all three countries since the proposed water agreement deals with the two rivers separately.

47 It should be noted that the recommended concentration of sodium should not exceed 20 mg Na/l when supplied to hospital patients. In the lower part of the Euphrates River in Syria, all recorded data exceed this limit.

48 A rule-curve means a function that defines the use of water – either for power production or for irrigation.

49 Cf. comments of J.A. Allan on the Study of the Euphrates River and the Tigris River, Water Resource Management, Volume I – Water Resources Analysis (COMPASS, 2005), http://www.compass-org.ch/Selected_literature/selected_literature1.htm

50 Cf. EAWAG: www.eawag.ch

51 COMPASS (2005) requested assistance from EAWAG in the report: "The Euphrates River and The Tigris River – Water Resources Management: Review of Report on Water Resources Analysis, Volume I, II and III" completed in March 2003. EAWAG was truly neutral in relation to the study since it had not been involved in any way. Some other conclusions were that:

- The mass balance approach chosen for the calculation of water and salt balances for the two rivers is very useful to demonstrate and analyse the water quantity and quality problems of the rivers. The "if-then" analyses performed strongly support negotiations as they show the effects of proposed water-use scenarios if the monitored runoff and assumed return-flow regime apply.
- The lack of reliable predictions for input data with respect to Return-flow quantity and quality and changes in climatic conditions introduce uncertainty for the future management regime. Given a prescribed set of water quantity and water quality targets, it is possible to scientifically derive water management rules. However, specification of the exact target values is a matter of social negotiation process with scientific constraints. This means that our current body of knowledge does not allow specification of management rules based on scientific reasoning alone.
- EAWAG approves of the modelling approach and assesses the analyses to follow standard scientific methods. The numbers recommended by the Technical Derivates (Vol. II) report are accepted as starting values, as they in general comply with the current practices. Further river basin data should, however, as proposed in the report, be collected by rigorous monitoring to continuously validate the recommendations."
- See also: http://www.cesar.no/Selected_publication/Selected_publication.htm

52 *Category 1:* Explicit Standards: Four international treaties and two US interstate compacts comprise the first category of water-quality-related treaties. Of the four international treaties, the 1978 Great Lakes Water Quality Agreement is the broadest in scope and provides the greatest detail concerning water quality standards. The 1972 and 1973 agreements between the US and Mexico, while much narrower in scope, contain specific guidelines to reduce the salinity of Colorado waters entering Mexico. The 1994 Convention on the Co-operation for the Sustainable Use of the Danube River, like the Great Lakes Agreement, covers a range of issues related to water quality and its management and outlines a number of co-operative measures to protect the Danube waters. However, rather than defining specific standards, the convention provides a general framework from which the signatories can devise appropriate water quality objectives and criteria. Of the three US interstate compacts included in this first category, the 1941 Interstate Sanitation Commission, one of the oldest compacts addressing water quality, provides the most complete set of effluent standards. The other two compacts, 1938 Rio Grande Compact and 1948 Ohio River Valley Water Sanitation Compact, each set standards related to particular substances (e.g. suspended solids and sodium).

Category 2: General Objectives: The majority of the documents reviewed fall into this second category of agreements, those that reference general objectives or programmes related to water quality. Included in this category are the remaining nine interstate compacts and 31 of the 53 international treaties containing water quality provisions. The dates of these agreements span nearly the entire 20th century and the international treaties relate to basins located in Asia, Africa, the Middle East and Europe. The signatories to these documents agree to certain water quality goals and in many cases broadly describe measures, to be undertaken individually or jointly, to manage the quality of their shared waters. When mentioned, the details of the water quality measures outlined are entrusted to the contracting parties for further negotiations and consultations, often with the assistance of existing or newly created water commissions.

Category 3: Indefinite Commitments: Category 3 includes documents containing only vague references to pollution abatement, prevention and control. While similarities exist between the category two and three agreements, those placed in the latter category are, in general, less specific in nature and do not describe measures to achieve the stated water quality objectives. Included in this category are 16 international water treaties drafted throughout the twentieth century and representing a wide range of geographic regions. Although the references to water quality in the Category 3 agreements are generally brief, many of the treaties, like those in the previous category, include commitments by the respective signatories to further co-ordinate water quality management efforts.

53 Neither Altinbilek nor other Turkish experts and politicians have, however, specified – in terms of a water agreement – what it would mean to look at the two rivers as one basin. This might be developed as the countries choose to co-operate, such as through the more recent technical initiative (ETIC), with Kent State University in the US as the catalyst.

54 Cf. the renowned Swiss water institution, EAWAG, as described above.

55 There are several management measures for irrigation. A primary concern for irrigation water management is the discharge of salts, pesticides, and nutrients to ground water and discharge of these pollutants plus sediment to surface water. The goal of these management measures is to reduce movement of pollutants from land into ground or surface-water from the practice of irrigation. This goal is accomplished through consideration of the following aspects of an irrigation system: 1) irrigation scheduling; 2) efficient application of irrigation water; 3) efficient transport of irrigation water; 4) use of runoff or tail-water; and 5) management of drainage water (cf. EPA, 2000).

56 Global Environmental Facility, a World Bank, UNDP and UNEP arrangement dealing with management of international resources.

57 See "Minutes from the Official Text" (242, Appendix D, Mexico, 30 August 1973) between USA and Mexico signed by their respective Presidents. Regarding the desalination plant, see: Leitz, Frank *et al*, 1978.

58 See GEF: www.gefweb.org

59 Such as the UN WHO's (World Health Organization's) Water Quality Standards as well as EU legislation, especially: Directive 2000/60/EC Establishing a Framework for EU Water Legislation, Directive 76/160/EEC, Directive 80/778/EEC as amended by 98/83/EC (*Drinking Water Quality*), Directive 91/271/EEC, and Directive 91/676/EEC (*Nitrates Directive Concerning Pollution from Agricultural Production*).

60 See, for example, www.nilebasin.org

61 See http://go.worldbank.org/NIYZ0JX6J0

Annexes

Section I, Part 1

Annex 1: Third party compensation mechanism for the Golan Heights

In COMPASS' publication (*Third Party Compensation Arrangements. Water Resources Management of the Golan Heights*, 2005a), some assumptions leading to conservative estimates are assessed in more detail:

- Costs account for expected population growth during the 30-year horizon of the analysis, but assume that income levels remain constant. Water demand and wastewater production could be expected to rise with rising income levels.
- Only Syrian incremental costs of the agreement are calculated. Israel may demand compensation for costs they incur in the passing of the Golan Heights back to Syria (e.g. loss of infrastructure investments on the Golan Heights). Syria may choose to compensate Israel for these investments, but the costs are not considered integral to the costs of guaranteeing water quality and quantity. Incremental costs may in some instances be incurred by Israel (e.g. Israel importing water instead of Syria), in which case they should be subtracted from the total figures given in Table 1 (COMPASS, 2005a).
- Cropping is not assumed to intensify with higher population. Water demand for cropping remains constant. Cropping extensification is assumed unlikely. Lack of data on cropping patterns makes it hard to predict crop switching and crop intensification.
- Industrial water demand is assumed to increase proportionally with population, based on current low levels. With large population resettlement industrial intensification and more than proportional increase in water demand is likely.
- Transportation costs of industrial solid waste have not been included. There was insufficient data to predict the structure of industrial solid waste production.
- Costs of treating agricultural and urban runoff / non-point sources are not included. It is recommended that costs of treating diffuse sources be excluded because technical feasibility of pollution control is highly uncertain.
- Land acquisition costs for water and wastewater infrastructure are not included.
- Infrastructure costs of local water distribution systems on the Golan Heights have not been included. It may be argued that potable water distribution would have to be in place for the resettled Syrian population regardless of where they live. In this sense they do not spring from the guarantees made to Israel. The same could not be argued for wastewater treatment infrastructure.

Assumptions that may inflate estimates:

- Water supply costs do not consider the possibility of wastewater reclamation. Reuse may significantly reduce estimates of water demand.
- Grazing intensity is assumed to increase proportionally with population. At some point before maximum incremental population, maximum sustainable yield of pasturelands is likely to be reached.

Other main assumptions:

- All figures are in US$ for December 2000 unless otherwise stated.
- Cost calculations in Table 1 (COMPASS, 2005a) are based on a scenario of maximum incremental population of 433,000.
- All infrastructure costs are based on US cost data. These are deflated to Syrian price levels using a correction factor of 0.25.
- In selecting sanitation technologies, only technical feasibility has been considered. It has been assumed that other infrastructure is in place (roads, power supply, water supply, administration etc.) and that local resources are available (construction, materials, skilled labour etc.).
- Capital costs are all investment costs in year 1 and are consequently not affected by the discount rate. Investment in capital replacement during the analysis horizon is counted as recurrent cost.
- All costs are given at market prices. No shadow pricing has been conducted.

Section III

Annex 1: Selected international literature

As part of the CESAR Technical Study *(2005b), the following international literature was investigated during 1996-1999.*

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Annex 2:
Overview of agreements on the Euphrates River and the Tigris River, joint technical meetings, and tripartite ministerial meetings between Turkey, Syria and Iraq.

This list is based on numerous oral and written sources and put together by the CESAR Foundation.

Agreements on the Euphrates and the Tigris Rivers

Dec. 1920

Convention on Certain Points connected with the Mandates for Syria and the Lebanon, Palestine and Mesopotamia [France (Syria), United Kingdom (Iraq)]

- Article 3 recognizes the importance of co-operation on irrigation plans that could diminish to a considerable degree the Euphrates and Tigris waters entering Iraq.

Oct. 1921

Agreement with View to Promoting Peace (Franklin-Boillon) [France (Syria), Turkey]

- Refers to the right of riparian states to share the waters of a transboundary river to give equitable satisfaction to the two Parties.
- Article 12 recognizes a right of the Syrian city of Aleppo to use Euphrates water in Turkish territory to meet its requirements.

July 1923

Lausanne Peace Treaty [Turkey, Allied]

- Article 109 affirms the necessity for agreement between states to manage transboundary waters.
- Includes a provision that Turkey must consult Iraq before undertaking any hydraulic works.

May 1926

Convention of Friendship and Good Neighbourly Relations [France (Syria), Turkey]

- Article 13 asserts Turkey's full co-operation for the purpose of necessary investigations.

May 1930

Final Protocol of the Commission of Delimitation [France (Syria), Turkey]

- Commits the two Parties to co-ordinate any plans to utilize the Euphrates waters.
- Article 2 contains some provisions regarding the Tigris.

March 1946

Ankara Treaty of Friendship and Good Neighbourliness [Turkey, Iraq]

- In Protocol 1 Turkey: obliges itself to report to Iraq on all its plans to utilize the Euphrates and Tigris waters; agrees to install permanent observation stations and ensure their operation and maintenance (costs of operation to be defrayed in equal parts by Iraq and Turkey); and accepts in principle the Iraqi right to construct dams within Turkish territory when necessary to improve Euphrates flow within Iraq.

1964

Turkey pledged to release 350 m^3/sec of Euphrates water.

1976

Turkey increased the minimum flow to 450 m^3/sec. (during Syria's impoundment of water for the Tabqa Dam).

July 1987

Protocol of Economic Cooperation

Temporary arrangement pending a tripartite agreement [Turkey–Syria]

- In Article 6 Turkey agreed to release a yearly average of more than 500 m^3/sec (during filling of Ataturk and until final allocation).
- Article 7 asserts that Turkey and Syria should work together with Iraq to allocate Euphrates and Tigris waters within shortest possible time.
- In Article 9 both states agreed in principle to construct and jointly operate irrigation and HEP projects.

April 1990

Bilateral agreement between Syria and Iraq for sharing Euphrates waters

- Syria would receive 42% and Iraq 58% of annual flows, regardless of quantity.

Joint Technical Meetings on Regional Waters

1962

Syria and Iraq formed a Joint Technical Committee, which had a very limited role as there were no major constructions at this time.

1972-73

Unsuccessful attempts by Syria and Iraq to negotiate an agreement on Euphrates waters.

1980

Protocol of the Turkish-Iraqi Joint Committee for Economic and Technical Cooperation - Creation of a Joint Technical Committee for Regional Waters (JTC)

May 1982

First JTC Meeting in Ankara, with experts from Turkey and Iraq

- Field trip to some Turkish project sites.
- Exchange of information on existing and planned projects.
- Iraq: river basins discussed separately; Turkey: rivers and tributaries as one basin.
- Preparation of detailed hydrology studies for next meeting.
- Iraqi proposal for basic data required (Annex 1).
- Renewed invitation to Syria.

Nov./Dec. 1982

Second JTC Meeting in Baghdad, with experts from Turkey and Iraq

- Continued exchange of information on existing and planned projects.
- Iraq: river basins discussed separately, Turkey: rivers and tributaries as one basin.
- Renewed invitation to Syria.

Sep. 1983

Third JTC Meeting in Ankara, with experts from Turkey, Syria and Iraq

- Syria informed about previous JTC work, which Syria agreed should continue.
- Exchange of available information on regional waters at next meeting.

June 1984

Fourth JTC Meeting in Baghdad, with experts from Turkey, Syria and Iraq

- Field trip to an irrigation project in the Tigris basin.
- Continued exchange of hydrological data.
- Opinions on Iraq's proposal for data required (Annex 1 of First JTC Meeting).

Nov. 1984

Fifth JTC Meeting in Damascus, with experts from Turkey, Syria and Iraq

- Field trip to Yarmouk Irrigation project.
- Discussion of ways to expand and improve exchange of hydrological and meteorological information.
- Turkish proposal (Annex 4) for sub-committees (hydrology, soil, agricultural economy, engineering planning).

June 1985

Sixth JTC Meeting in Ankara, with experts from Turkey, Syria and Iraq

- Field trip to Karakaya Project.

- Discussion of ways to expand and improve exchange of hydrological and meteorological information.
- Views on Turkish proposal for sub-committees (Annex 4 of Fifth JTC Meeting): Turkey insisted on proposal, while Syria and Iraq disagreed.

Jan. 1986

Seventh JTC Meeting in Baghdad, with experts from Turkey, Syria and Iraq

- Field trip to barrages under construction (Kufa and Abbasiya).
- Discussion of ways to expand and improve exchange of hydrological and meteorological information.
- Discussion on previous Turkish and Iraqi propositions.
- Turkey presented amended proposition (Annex 4).
- Turkish statement regarding impoundment of Karakaya reservoir.
- Importance of regional water pollution investigations, exchange of related data.

June 1986

Eighth JTC Meeting in Damascus, with experts from Turkey, Syria and Iraq

- Field trip to sections of the Euphrates Projects near Raqqa and Deirezzor.
- Discussion of ways to expand and improve exchange of hydrological and meteorological information.
- Importance of regional water pollution investigations, exchange of related data.
- Exchanged information on progress in construction of dams.
- Turkey informed on impoundment of Karakaya.
- Iraq informed on impoundment of Kadasiya.
- Proposals by all three countries studied: agreement on hydrological and meteorological items, but not on other items.

Nov. 1986

Ninth JTC Meeting in Ankara, scheduled at the Eight JTC Meeting

Jan. 1988

Tenth JTC Meeting in Baghdad, with experts from Turkey, Syria and Iraq

- Field trip to the new Hindiya Barrage project on The Euphrates River.
- Continued exchange of hydrological and meteorological information.
- Exchanged information on present situation of dam construction and reservoir impoundment.
- Discussed different viewpoints concerning the work of the JTC.
- Turkey submitted modified proposal (Annex 4): agreement reached on hydrological studies but not on soil, agricultural and engineering items.
- Took note on the joint measurements of the Euphrates discharge at Belkiskoy, Jarablus and Kadahyeh, which had been performed by Turkish and Syrian sides for four runs, with the presence of Iraqi observers for the third run.

Nov. 1988

Eleventh JTC Meeting in Damascus, with experts from Turkey, Syria and Iraq

- Discussion of ways to continue and improve exchange of hydrological and meteorological information.

- Exchanged information on progress in construction of dams.
- Discussed different viewpoints concerning the work of the JTC.
- Discussed Turkey's modified proposal (Annex 4 of Tenth JTC Meeting): agreement reached on hydrological studies but not on all other points.
- Wish to intensify meetings to fulfil determined task of the JTC.

March 1989

Twelfth JTC Meeting in Ankara, with experts from Turkey, Syria and Iraq

- Field trip to Ataturk Dam Project.
- Exchanged hydrological data.
- Exchanged information on progress in construction of dams.
- Discussed mechanism for studying water requirements of the three countries: no progress achieved, need to intensify efforts to reach common viewpoint.

April 1989

Thirteenth JTC Meeting in Baghdad, with experts from Turkey, Syria and Iraq

- Field trip to Saddam project on the Tigris River and to pumping station of North Jazira project in Nineva province.
- Exchanged hydrological data: Turkey agreed to provide hydrological and meteorological information for better management during the drought for current water year.
- Exchanged information on progress in construction of dams.
- Iraq informed on Thartar and Main Outfall Drain projects.
- Did not reach common understanding on:
  - whether Euphrates and Tigris should be viewed separately or as one basin;
  - methodology to study and assess factors related to the mandate of JTC.

Nov./Dec. 1989

Fourteenth JTC Meeting in Damascus, with experts from Turkey, Syria and Iraq

- Exchanged hydrological and meteorological data.
- Exchanged information on progress in construction of dams.
- Turkey informed on initiation of impounding of Ataturk reservoir.
- Syria and Iraq asked Turkey to shorten the closure period.
- Turkey: not technically possible, has already been fixed for a minimum range.

March 1990

JTC Meeting in Ankara, with experts from Turkey, Syria and Iraq

- Turkey's proposal for scientific research regarding water use rejected.
- Syria and Iraq insisted on agreement on water distribution instead of more studies.

May 1990

JTC Meeting, with experts from Turkey, Syria and Iraq

- Iraq demanded an increase of the Euphrates flow to 700 m^3/sec

Sep. 1992

JTC Meeting in Damascus, with experts from Turkey, Syria and Iraq

- Syria and Iraq reiterated call for a trilateral agreement.

- Turkey argued that the 1987 quota agreement was equitable and adequate for downstream needs, and that Syria and Iraq should use water more efficiently.

Tripartite Ministerial Meetings on Regional Transboundary Watercourses

Nov. 1988

First Ministerial Meeting

May 1989

Scheduled Ministerial Meeting did not take place.

June 1990

Second Ministerial Meeting in Ankara, with Irrigation Ministers from Turkey, Syria and Iraq

- Turkey defined the Euphrates flow as 'transboundary waters', while Syria and Iraq consider The Euphrates River to be 'international'.
- Turkey's Three-Staged Plan for Optimum, Equitable and Reasonable Utilization of the Transboundary Watercourses of the Tigris-Euphrates Basin.
- Syrian proposal on mission of the committee.
- Iraqi proposal that Turkey will release not less than 700 m^3/sec at the Turkish-Syrian border until a final agreement on water distribution has been reached.

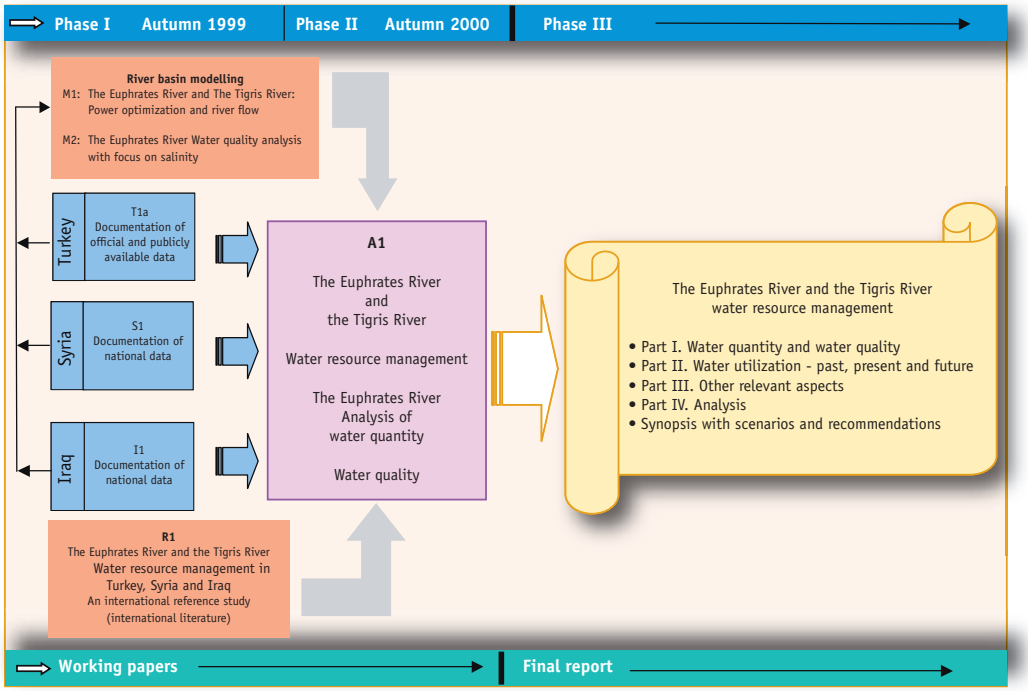
Jan. 2001

Affirmation of the not-public bilateral agreement between Syria and Iraq (from April 1990) for sharing Euphrates waters

Syria would receive 42% and Iraq 58% of annual flows (from Turkey to Syria), regardless of quantity.

Annex 3: Planning structure, data and methods

Illustration of the planning structure of the water resource management analysis for the Euphrates and the Tigris River basin



Data and methods

During the process of the study, the data made available by the three countries was considered to be of adequate reliability and validity to be able to draw conclusions with an acceptable degree of accuracy.

The key areas of water management regarding the two rivers are dealt with *in extenso* in the study, including the data, the methods applied, and the technical analyses of the modelling data. In order to fulfil the stated objectives, the following methodological approach was applied:

- Adapt and evaluate river basin data authorized by the watercourse countries, as well as publicly available national data.
- Perform an assessment of existing water quality data in relation to international guidelines on water quality for different usages, with a focus on drinking water and irrigation.
- Perform an assessment of hydro-power production in Turkey (the only country with significant hydro-power production).

- Accomplish sensitivity analysis and appurtenant consequence analysis of different management policies regarding: economical efficiency of the water; water quantity; and water quality.

In the technical study, only the questions asked, the findings, and the reservations regarding the validity of the results are described. The scope of the study is described with respect to the four areas of analysis: optimized power production; economical efficiency; water quantity; and water quality.

One may argue that the emphasis should have been put on other aspects, but during the course of consultations with the three countries, as well as the application of accepted principles of river basin studies, these four areas were emphasized.

Annex 4: Use of terms in the proposed trilateral water agreements

A Trilateral Water Agreement for the *Euphrates River* and the *Tigris River* means (a) water management agreement(s) of the two *watercourses* for the three *watercourse countries*;

Watercourses means in this context the two rivers constituting, by virtue of the relationship between the two, interlinked watersheds;

A watercourse state or country refers to Turkey, Syria or Iraq, as riparian to the two watercourses;

A Regional Water Management Organization means an organization that deals with the implementation of a *Trilateral Water Agreement and the TPCM;*

A Third Party Compensation Mechanism (TPCM) is a fund set up to assist the core states to implement the agreement, especially related to maintaining water quality and improving efficiency.

In addition, the following definitions apply to:

a. Consumption:	The total long-term average volume of water consumed by all users (including return-flow), e.g., domestic, industrial and agricultural.
b. Target consumption:	The design value for the consumption.
c. Actual consumption:	The total volume of water extracted from the sources in a single year
d. Design return flow:	The planned feedback of water to the sources generated by the target consumption.
e. Net target consumption:	Target consumption minus the design return flow.
f. Total yearly runoff:	The total volume of water generated in a watercourse in a year.
g. Total yearly flow:	The volume of water passing a monitoring station in a year, expressed as m^3/year.
h. Discharge:	The volume of water passing a monitoring station at any moment of time, expressed as m^3/s.
i. Average discharge:	Total yearly flow divided by 31,536 x 106.
j. Minimum discharge:	The absolute minimum discharge not to be less than the stated value.
k. Maximum discharge:	The absolute maximum discharge not to be exceeded.
l. Rule curve:	A function that defines the use of water – either for power production or for irrigation.
m. Reservoir level:	The water level in a reservoir relative to a defined zero level.
n. Active reservoir:	The part of the total reservoir volume that may be used in the reservoir management.

Annex 5: Possible common elements in any trilateral water agreement

Reservations: The author does not expect that any trilateral river basin agreement will look exactly like the proposed one. Any agreement is subject to political and technical negotiations, and the technical study does not provide enough scientific underpinning to propose exact figures nor an actual text. It does, however, attempt to illustrate what such an agreement could look like.
Urgency: More importantly, however, the proposed agreement illustrates how the three countries could develop an agreement that includes some important principles for sustainable water management.
Please note: In case the three countries decide to consider the two rivers as one basin, the allocated water volumes to Turkey and Syria will probably be reduced (since the rule-curves for each river may not be applied). However, if water pollution is more or less going to be ignored, the allocated water volumes to Turkey and Syria may increase.

Part I. CO-OPERATIVE ACTIONS

I. A Regional Water Management Organization

A Regional Water Management Organization shall implement the Trilateral Water Agreement and the Third Party Compensation Mechanism, and the strategies derived thereof.
The Organization consists of 6 members – 2 from each Core State, appointed by the respective state. In addition, 3 additional extra-regional members will be invited by the Core States that will bring in funding, expertise and additional oversight. The Chair is held by each Core State in turn for a period of 1 year – starting in alphabetical order.

II. Regional Water Management Organization meetings

Regular Steering Group meetings
The Group meetings are normally held twice a year. The agenda shall include, but not be limited to the following items:

1. Adoption of the draft agenda, and approval of the minutes from the last meeting.
2. Based on the reports from the Technical Group on water quantity and water quality for the previous 6-month period, make a decision on strategy for the next 6 months on water quantity and water quality [as an input into operation of rule-curves].
3. Based on the reports from the Technical Group, make a decision on management of the monitoring and verification mechanism.
4. Based on the reports from the Technical Group, make a management decision for the Third Party Compensation Mechanism.

II. Regular Technical Group meetings

The Technical Group Meetings are held prior to the Steering Group meetings and give technical recommendations to the Group. The agenda shall include, but not be limited, to the following items:

1. Adoption of the draft agenda and approval of the minutes from the last meeting.
2. Status reports on water quantity and water quality for the previous 6-month period.
3. Recommendation on strategy for the next 6 months on water quantity and water quality [as an input into operation of rule-curves].
4. Discussion and recommendation on monitoring and verification procedures and functionality.
5. Discussion and recommendation on use of funds from the Third Party Compensation Mechanism.

III. Emergency meetings

Any diversion from the stated limiting water quantity or quality value ranges (timeframe defined), emergency meetings may be called for by any of the Core States or one of the 3 extra-regional ones. After notification is given to the Chairman, the meeting shall be held within 2 weeks. The agenda of the emergency meetings are determined by the problem faced, and the purpose of the meeting is to agree on suitable actions.

III. Consecutive model calibration and analysis

The Regional Water Management Organization should work towards managing a regional water management model for the simulation of water quantity and water quality.

The model shall undergo a consecutive calibration based on the 6-month status reports to be able to predict short-term effects and long-term changes under the prevailing conditions.

IV. Verification

All monitoring systems in the watercourse countries related to the ..... and ..... shall be subject to verification by the Regional Water Management Organization. The watercourse countries shall approve verification procedures before they are put into force.

V. Notification concerning planned measures with possible adverse affects

(The Regional Water Management Organization shall be notified of any planned measure, which may have an adverse effect on the watercourse environment for verification and approval. Such notification shall be accompanied by technical data and information including the results of any environmental impact assessment.)

PART II: GENERAL PRINCIPLES

VI. Equitable and reasonable utilisation and participation[a)]

The watercourse countries shall in their respective territories utilize the international watercourses in an equitable and reasonable manner. In particular, the watercourses shall be used and developed by the watercourse countries with a view to attain optimal and sustainable utilization thereof and benefits, therefore, taking into account the interests of the watercourse countries concerned, consistent with adequate protection of the watercourses.

The watercourse countries shall participate in the use, development and protection of the watercourses in an equitable and reasonable manner. Such participation includes both the right to utilize the watercourses and the duty to co-operate in the protection thereof, as provided in an agreement.

VII. Factors relevant to equitable and reasonable utilization[b)]

PART III: WATER ALLOCATION PRINCIPLES AND VALUES

VIII. Basis for agreed water allocation and water quality parameters and values:

1. The following water allocation and water quality principles and values must be based on agreed base-line documentation[c)] (e.g., over a 2-5 year period) as a co-operative action between the three watercourse countries.
2. Final water allocation and water quality parameters and values must therefore be based on the above-mentioned documentation.
3. It should be noted that the allocation principles and values are based on the prerequisite that a minimum discharge at the point of convergence of the two watercourses should probably not be less than 150 m^3/s of the Euphrates River.
4. Based of the data available, the following indicative and preliminary water allocation and water quality parameters and values are suggested:

PART IV: WATER FLOW BALANCE MANAGEMENT

XII. Flow monitoring in the Euphrates River and the Tigris River

The watercourse countries shall establish harmonized river discharge monitoring systems. Monitoring shall be performed according to internationally accepted standards. This shall include, but not be limited to:

- two real-time monitoring stations in each state;

- the number and location of stations shall be agreed upon by the watercourse countries;
- discharge figures are electronically stored once a day;
- flow data shall be reported twice a year for each of the watercourse countries (according to Part I, sub-para. II).

XIII. Monitoring of reservoir volume

Remaining reservoir volume is the basis of the application of rule-curves for power production and irrigation.

As reservoir volume is a function of reservoir level, the reservoir level shall be monitored with an agreed accuracy.

Reservoir level results shall be reported (at least) twice a year with computed data for reservoir volume (according to para. II).

XIV. Watercourse volume of water assessment

Available runoff in the watercourse is a function of precipitation and other climatic conditions.

To meet any unforeseen emergency situations, with respect to water quality, an available runoff assessment system shall be established.

PART V: WATER QUALITY MANAGEMENT

XV. Environment protection and preservation

The watercourse countries shall individually and, where appropriate, jointly:

- protect and preserve the hydrological ecosystems; and
- prevent, reduce and control pollution that may cause significant harm to the environment, including public health and safety of the users of the water of the Euphrates Watercourse and the Tigris Watercourse.

Once a year, a biota classification is performed on one agreed location in each of the watercourse countries on the Euphrates River and the Tigris River.

Paragraph XVI is specified in the two models[c]: *XVI Preliminary maximum permissible values*

XVII. Water quality monitoring system

The watercourse countries shall establish harmonized water quality monitoring systems. Monitoring and water analyses shall be performed according to internationally accepted standards. This shall include, but not be limited to:

- two real-time monitoring stations in each watercourse country;
- the number and location of stations shall be agreed upon by the countries;
- one water sampling station in each country where a 24-hour composite sample is taken once a week.

XVIII. Water transport from or between the watercourses

This section has to be tailored to either single-basin or twin-basin models.

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a) The text in this section is based on the same article in the UN Framework Convention on the Law of Non-navigational Uses of International Watercourses.

b) The text is subject to development at a later stage since it is interlinked with a final agreement.

c) In the technical study, models for the Euphrates River and the Tigris River are based on a 40-year rainfall/runoff period: 1938-1977 and 1948-1987, respectively.

Paragraphs IX, X, XI and XVI are illustrated at the end of this Annex relating to (IX) Water use and water allocation, (X) Rule-curve for irrigation for the Euphrates watercourse, (XI) Preliminary values of discharge of the Euphrates River, and (XVI) Preliminary maximum permissable values.

INDICATIVE WATER USE AND WATER ALLOCATION IN 'SEPARATE-BASIN MODEL'

IX. Water use and water allocation

The following indicative water allocation values could be further elaborated, with the values for the Euphrates having a stronger technical basis than those for the Tigris.

Approximate water allocation for the Euphrates watercourse[1]

	Target consumption, billion m^3/year		
	Turkey	Syria	Iraq
Euphrates	7	7	13

Illustrative water allocation for the Tigris watercourse[2]

	Target consumption, billion m^3/year		
	Turkey	Syria	Iraq
Tigris	7	3	x[3]

The two tables reflect the result of the technical study that there is a need of a minimum flow of the Euphrates River at the point of convergence of the two rivers (the exact amount to be determined).

X. Rule-curve for irrigation for the Euphrates watercourse

To prevent the Euphrates watercourse from being polluted – especially during the dry periods – rule-curves for the extraction of water for irrigation purposes should be applied.

The rule-curves shall be revised according to the results of a yearly rule-curve evaluation. It might look like the following:

Approximate rule-curve for irrigation of the Euphrates watercourse

Remaining active reservoir volume	Permissible extraction, % of target consumption		
	Turkey	Syria	Iraq
V > 75%	100	100	100
50% < V < 75%	80	80	80
25% < V < 50%	40	40	40
V < 25%	0	0	0

XI. Preliminary values of discharge of the Euphrates River

Parameters	At Turkish-Syrian border	At Syrian-Iraqi border	At convergence point with Tigris River
Absolute minimum discharge, m^3/s	450	270	150
Expected maximum long-term average[4] m^3/s	750	550	150

Note: The exact minimum discharge values are subject to negotiations.

XVI. Preliminary maximum permissible values

The maximum permissible values accepted by the watercourse countries as normal values that do not require specific action are given in the table below.

The indicative and preliminary maximum permissible value could be as follows:

Parameter[5]	Salinity: total dissolved solids, TDS/l
Turkish-Syrian border	400[6]
Syrian-Iraqi border	800[7]

For example, if any of the values reported in the half-year report show a total change of +30% over two successive periods, the watercourse countries shall investigate the cause of changes and report to the Regional Water Management Organization (RWMO), which may invoke mitigating actions.

1 The actual consumption may be lower than the target consumption due to climatic variation.
2 The actual consumption may be lower than the target consumption due to climatic variation.
3 No reliable data made available. To be estimated.
4 Conservative estimates from a river modelling perspective (based on the 40-year rainfall/runoff period).
5 It is recommended that additional parameters be included in a water regime framework.
6 Value to be revised according to the base documentation (cf. the study – on drinking water quality parameters).
7 Value to be revised according to the base documentation (cf. the study – on drinking water quality parameters).

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This book proposes practical and objective solutions to the entrenched water conflicts in the Middle East. The author reveals and clarifies the complexity of the water conflicts, drawing on years of experience facilitating and chairing water negotiations in the region.

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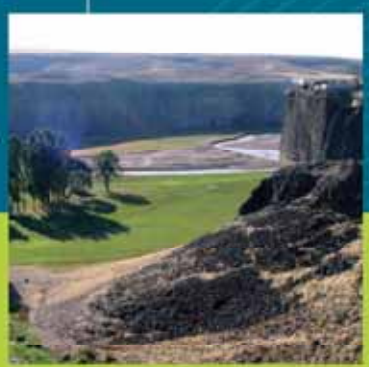
Dr. Jon Martin Trondalen has chaired multilateral negotiations on water disputes in the Middle East; assisted governments and the United Nations in resolving environmental and water resource disputes; and trained diplomats and technical delegates in enhancing negotiation skills. He was granted Special Fellow status by the UN several times for work on international environmental conflict resolution and preventive diplomacy and action.

He has worked for the Norwegian Church Aid and the World Bank, as well as with the Norwegian Research Council, and has spent 13 years at the University of Oslo as full professor in resource geography. He is founding director of CESAR Foundation (Oslo), Compass Foundation (Geneva), and one of the founders of the International Water Academy.



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