

WATER CONFLICTS IN THE MIDDLE EAST BETWEEN THE PRESENT AND THE FUTURE

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1. INTRODUCTION

The Middle East belongs; in general; to the arid and semi arid areas. Such areas are characterised normally by low rainfall quantities and high temperature and evapotranspiration. Scarcity of water resources is a common phenomena there.

The Middle East suffers from several water-related problems, which are expected to become more serious in the near future, unless the necessary steps are taken soon.

But why are there water problems in the Middle East? The answer is; basically; due to the following reasons:

1. Scarcity of naturally available water resources.
2. Rapid increasing demand on these resources due to the rapid population growth and the ambitious development programs for the different countries in the region, including programs in the irrigation sector.
3. Lack of proper management of these water resources.
4. The inefficient usage of these resources in some cases.
5. Lack of proper cooperation between the countries of the region.
6. Using old methods in irrigation.
7. Old water networks with high losses and unaccounted-for water.
8. Cultivating crops which need high water demand.
9. Using fresh water quantities in wrong places like swimming pools, etc.
10. Not using alternative water resources in an efficient way (like treated wastewater, salt water desalination and cisterns).

All these factors result in increasing tension and conflicts between the Middle Eastern countries over the usage of these water resources. They also result in the lack of future perspectives for the development of the area and how to use these resources in the most efficient way.

Just to have a simple idea about the seriousness of the water problem in the Middle East, it is enough to mention that the Arab World in the Middle East and North Africa (MENA) makes around 10% of the world's total area and 5% of its total population, but it contains less than 1% of its renewable fresh water resources.

The population growth in the area is one of the highest in the world, which means a rapid increase in the domestic water demands. Also many Arab countries depend a lot on agriculture, which means more water quantities for irrigation. These factors will worsen the water problem in the future.

Next is a brief description of the major water conflicts in the Middle East. That will be followed by a comprehensive description of two of them: Jordan River and Water resources in Palestine (mainly groundwater).

2. MAIN WATER CONFLICTS IN THE MIDDLE EAST

2.1 Euphrates and Tigris

These two rivers (known in Arabic as Al-Furat and Dijla) are; together with the Nile; the largest three rivers in the Middle East. The area between Euphrates and Tigris, known in history as Mesopotamia (current day Iraq) witnessed some of the great world civilisations. The two rivers are shown in figure 1.

The two rivers originate in south eastern Turkey. Euphrates flows from Turkey to Syria then to Iraq. Tigris flows through Turkey, then it makes the borders between Turkey and Syria for around 32 km before it flows through Iraq where it receives some tributaries from Iran. Finally the two rivers meet inside Iraq to form Shat Al-Arab which ends in the Persian Gulf.

Turkey is in a serious dispute with Syria and Iraq over the two rivers. The Turkish are implementing a huge water project called GAP (South Eastern Anatolian Project), in which 22 dams and 19 power plants are to be built on the two rivers. Many of them are already built and caused substantial reduction in the water quantities flowing to Syria and Iraq. The two countries see that as a serious threat to their water supplies, because the two rivers make 98% of the water resources in Iraq and 90% of Syria's water resources.

2.2 Orontes

The Orontes (known in Arabic as Al-'Asi) is a small river compared to the Euphrates and Tigris. It originates in Lebanon and flows northwards through Syria until it ends up finally in the Mediterranean in the Alexandretta (Al-Iskandarun) Province, not far from the city of Antioch (Antakya).

Turkey demands to discuss the issue of the Orontes with Syria and to be considered as a riparian to the river. Syria's point of view is that the river ends up in Al-Iskandarun Province, which is a Syrian land given to Turkey illegally by France in 1939 during the French colonisation of Syria. Therefore, the annexation of this province by Turkey is illegal and Turkey is not a riparian to the Orontes and can not claim rights in the river.

2.3 Litani

Not far from the sources of the Orontes, another river starts, but this one flows southwards then westwards until it ends in the Mediterranean Sea in South Lebanon. This is the Litani.

The Litani is a small river and flows entirely inside Lebanon, therefore it is a „Lebanese River“, but the Israelis wanted always to use its water even before the establishment of the state of Israel.

The Zionist movement, which recognised the importance of water in the area from the very beginning, included the river in the borders of the “to be established” state of Israel at that time. These borders included also all the main water resources in the area: the complete Jordan River System (including Yarmuk, Dan, Baniyas, Hasbani rivers, Lake Tiberias, Dead Sea, etc.), Golan Heights, all water resources in Palestine, etc. The Israeli invasion of Lebanon in 1978 was called „Litani Operation“.

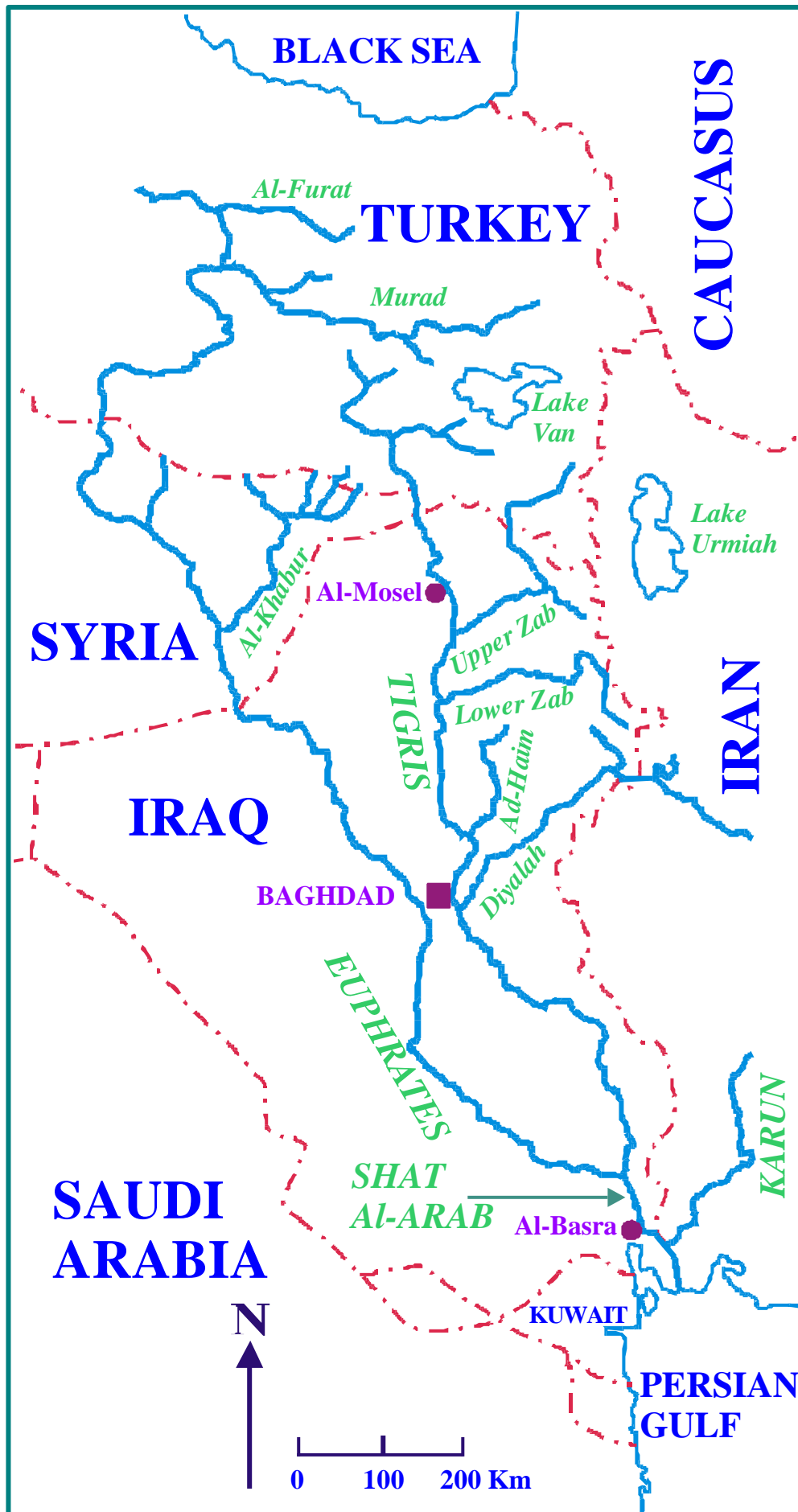


Figure 1: Euphrates and Tigris (modified after ref. 13).

2.4 Golan Heights

This is a Syrian land, which was occupied by Israel in 1967 and annexed in 1982.

The area is rich with its water resources. It supplies water; totally or partially; to the following water bodies: Baniyas River, Yarmuk River, other wadis feeding the Jordan River, and it has access to Lake Tiberias. Its richness in water resources is one of the main reasons for the Israeli refusal to return it back to Syria.

2.5 Nile

The Nile is the longest river in the world. It originates from the central African countries and from Ethiopia and ends in the Mediterranean Sea in Egypt after passing through Sudan.

Most of the Nile water comes from Ethiopia, and the current conflict over the river is mainly between Egypt and Sudan on one side with Ethiopia on the other. The Ethiopians want to construct dams on the Nile tributaries inside their country (especially on the Blue Nile, which supplies the Nile with around 60% of its water). This is seen by Egypt as a dangerous development since the country depends almost entirely on the water of the river.

3. JORDAN RIVER

The Jordan River is located in an area called in Arabic Bilad As-Sham (Sham Land), which includes: Syria, Historical Palestine (nowadays Palestine and Israel), Jordan and Lebanon.

The River is around 350 km long, it originates from the footsteps of Mount Hermon (Jabal As-Sheikh) on the border section between Historical Palestine-Syria-Lebanon and ends in the Dead Sea. It has a total annual flow of around 1300 Mm³. The river meanders a lot, especially in the Lower Jordan, which makes that part unsuitable for navigation.

Even though it is a small river, but the Jordan is one of the most well known rivers in the world, mainly for two reasons:

1. It is a holy river where Jesus the Christ was baptised by John the Baptist. It played also a well known role in history.
2. It is located in an area where every drop of water counts.

The Jordan has three main tributaries at its origin:

- Dan (Al-Qadi): originates from Historical Palestine (nowadays Israel) and has a total annual „stable“ flow of around 250 Mm³.
- Baniyas: Originates from Syria (Golan Heights) and has a total annual „fluctuating“ flow of about 125 Mm³.
- Hasbani: Originates from Lebanon (South Lebanon) and has a total annual „fluctuating“ flow of about 125 Mm³.

The three tributaries meet each other inside Historical Palestine, just north of Lake Al-Huleh. Other main tributary of the Jordan is the Yarmuk River, which joins it just south of Lake Tiberias (Sea of Galilee).

The main elements in the Jordan River System are: Upper Jordan, Lower Jordan, Lake Tiberias, Yarmuk River, and Dead Sea. See figure 2.

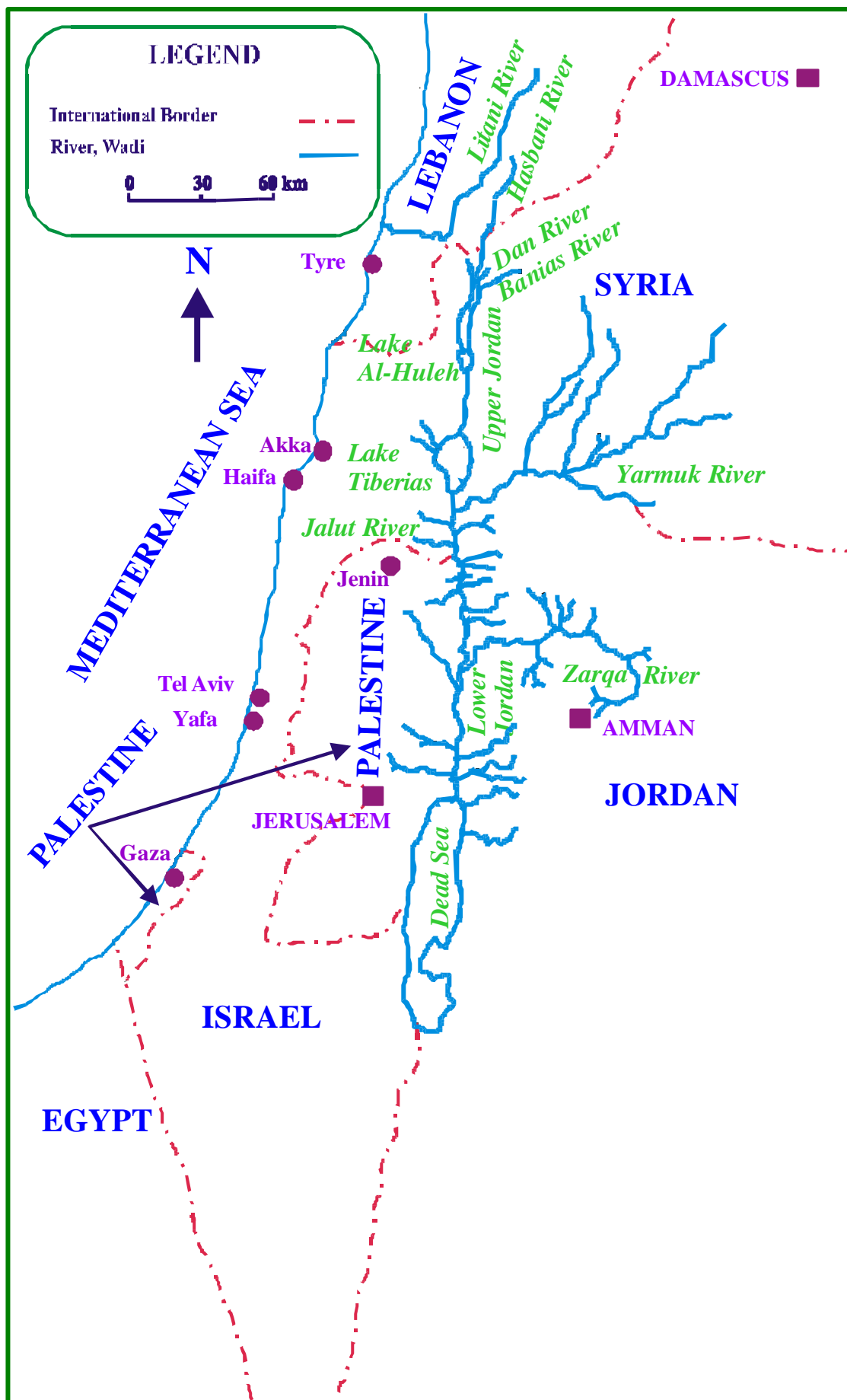


Figure 2: The Jordan River System (modified after ref.10).

The Jordan River is normally sub-divided into two main parts:

- Upper Jordan: the part between its origin on Mount Hermon and Lake Tiberias.
- Lower Jordan: the part between Lake Tiberias and the Dead Sea.

Israel diverts the water of Upper Jordan through its „National Water Carrier“, which carries the water from Lake Tiberias to the centre of the country and the south (An-Naqab „Negev“ Desert).

The conflict over the Jordan River is mainly between Israel on one side with the other riparians of the river on the other: Palestine, Syria, Lebanon and Jordan.

This „competition“ or „conflict“ started long time ago. Therefore there were several plans in the past to distribute its water between the riparian countries. The most well known between them is Johnston Plan.

Johnston is an American who came to the area as an envoy of the US president at that time Eisenhower. He stayed for 2 years (1953-1955), after which he made his plan to distribute the Jordan River's water. The shares of the different countries according to the plan, are as shown in table 1.

Table 1: Shares of the different riparian countries in the Jordan River's water according to Johnston Plan.

Country	Share in Jordan River's water (Mm ³ /yr.)
Palestine	257*
Jordan	463
Israel	400
Syria	132
Lebanon	35
Total	1287

* At the time of the plan, the Palestinian West Bank was ruled by Jordan, therefore the share of Palestine and Jordan was set together at 720 Mm³/yr. Some literature estimated the share of Palestine at around 257 Mm³/yr., some others estimated it at 215 Mm³/yr.

However, the current usage of the river is much different and is shown in table 2.

Table 2: The current usage of the Jordan River's water by the different riparians.

Country	Usage of the Jordan River's water (Mm ³ /yr.)
Israel	700
Palestine	0.0
Other Arabic countries: Jordan, Syria and Lebanon	410
Total	1110

Israel uses more than 700 Mm³/yr. (i.e. 300 Mm³/yr. more than its share). Palestine uses nothing and the other three Arab countries (Syria, Lebanon and Jordan) use around 410 Mm³/yr.

Before 1967 the Palestinians in the West Bank had access to the Jordan River and could use some of its water through 140 pumping stations installed on it. Soon after the Israelis

occupied the West Bank in that year they destroyed or confiscate all these pumping stations and prevented the Palestinians from using the water of the river or even reaching it. Now the Palestinians have no access to the river at all.

The current situation has lots of harmful effects on the environment of the area. The usage of most of the river's water in its upper part turned the lower part into a small stream carrying not more than 200-300 Mm³/yr. of salty and bad quality water to the Dead Sea. The result was a lot of damage to the Dead Sea itself: it lost 25% of its total area, its southern part disappeared, its water level is in a continuous decrease at a rate of around ½ a meter/yr., it dropped from 392 m below mean sea level (bmsl) in the early 1960's to around 414 mbms in 2001.

4. WATER RESOURCES IN PALESTINE

Water resources in Palestine are scarce. What makes the problem worse is politics, because Israel uses most of the Palestinian water resources and prevent the Palestinians from using them. Water resources there are groundwater, surface water and other resources like cisterns and some treated wastewater. Description is given next to the first two of them.

4.1 Groundwater

Palestine is one of few countries in the world, which depends on groundwater more than surface water. The same applies to Jordan and Israel. Almost 100% of the Palestinian water consumption nowadays come from groundwater.

There are two main aquifers in Palestine, as shown in figure 3:

a) Mountain Aquifer

This is the main aquifer in Palestine. It covers all the West Bank and extends in small areas to Israel.

The total annual recharge of the aquifer (according to article 40 of Oslo B agreement) is 679 Mm³, of which 78 Mm³ are brackish water.

This aquifer is made of three main basins:

1. Western Basin

The largest between the three and covers all the western part of the West Bank with a total area of about 1780 km².

2. North Eastern Basin

The second largest between the three in terms of its fresh water quantities. It is located in the north of the West Bank; mainly in Jenin Governorate; and has a total area of about 610 km².

3. Eastern Basin

The smallest in terms of its fresh water quantities, but the largest in terms of its area. It covers all the eastern part of the West Bank and has a total area of about 3260 km².

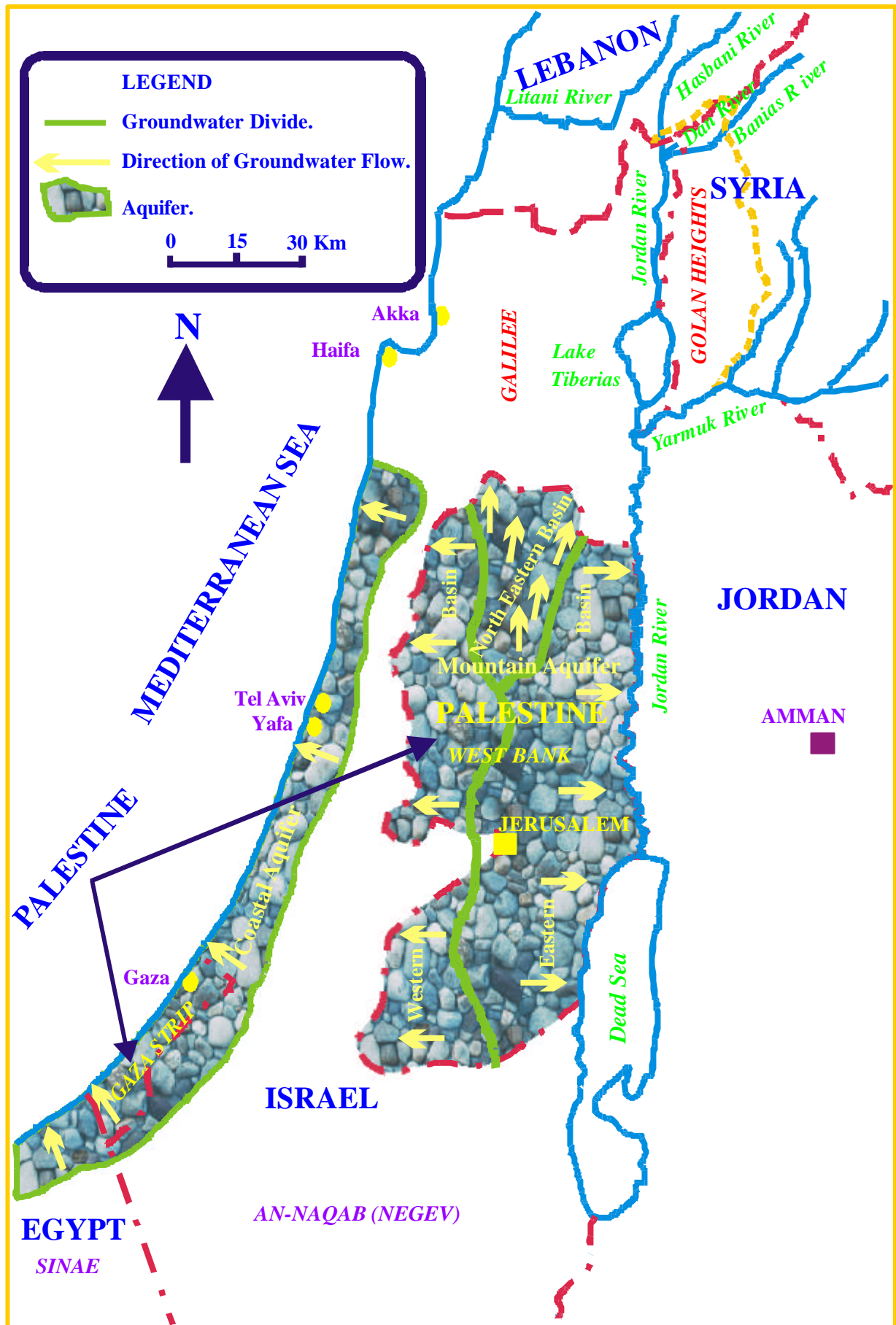


Figure 3: Groundwater aquifers in Palestine (modified after ref. 10).

At the time being Israel uses most of the water quantities of the three basins (more than 80%), as shown in table 3.

Table 3: The annual fresh water yield of the three basins in the Mountain Aquifer of Palestine and their usage by Palestine and Israel. (source: Article 40 of Oslo B Agreement).

Basin	Available yield (Mm ³ /yr.)	Palestine usage (Mm ³ /yr.)	Israel usage (Mm ³ /yr.)
Western Basin	362	22 (6%)	340 (94%)
North Eastern Basin	145	42 (29%)	103 (71%)
Eastern Basin	94*	54 (57%)	40 (43%)
Total West Bank Basins (Mountain Aquifer)	601	118 (20%)	483 (80%)

* In addition to that, there are 78 Mm³/yr. of brackish water which are not used and need to be developed.

Since the occupation in 1967 Israel imposed lots of restrictions on the Palestinian water sector, which resulted in lots of harms to it. As an example, the Israelis prevent the Palestinians from drilling new wells and impose certain pumping quota on the existing ones, which should not be exceeded.

b) Coastal Aquifer

Extends along the coast of the Mediterranean Sea from south of Haifa in the North to Al Arish in the south. The Palestinian Gaza Strip is located entirely within this aquifer.

The total annual recharge of the aquifer is around 330 Mm³, of which around 50 Mm³ originates from Gaza Strip. These 50 Mm³ are not enough to satisfy the demands of the people in the area and Israel uses all quantities originating in its territories. Therefore the Palestinians are forced to over pump the aquifer by around 50 Mm³/yr. in order to satisfy their basic needs. Overpumping of the aquifer is also assumed to be happening in Israel.

The overpumping of the aquifer resulted in the deterioration of its water quantity due to salt water intrusion from the sea and the upconning of salt water from underneath. The aquifer is now in critical conditions.

4.2 Surface Water

In addition to the Jordan River, which is the main surface water body in Palestine, there are several surface water bodies in the country. Most of them are seasonal, except 4 small permanent wadis. The total annual seasonal surface flow in Palestine is estimated normally at 100 Mm³/yr.

Even though seasonal surface water plays a less important role than groundwater and Jordan River, still it can have a substantial contribution.

The Israelis prevent the Palestinians from constructing any kind of hydraulic structures on the streams of these bodies in order to use their water. Therefore the Palestinians remained always unable to use them. Israel uses the water of some of them inside its territories.

5) FINAL REMARKS

Water resources in the Middle East are scarce for sure and not enough in many countries to satisfy their demands. This scarcity is assumed to become more in the near future.

The Middle Eastern countries have one of two choices:

1. Either to compete over the existing resources without developing new ones and that will result in more conflicts and may be wars over these resources.
2. Or to cooperate between them in order to use the existing resources in the most efficient way and to develop new ones. That will result in a solution to these water problems and will be an example for these countries to cooperate in other fields.

But these countries need from the very beginning to divide the existing resources between them in a fair way, so that every country can feel satisfied and willing to cooperate and work with the others.

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