# Water Crisis in the Middle East: An Opportunity for New Forms of Water Governance and Peace

by Joshka Wessels

*The Middle East and North Africa Region (MENA) is the most water scarce region in the world. Worldwide, the average water availability per person is close to 7,000 m3/person/year, whereas in the MENA region, only around 1,200 m3/person/year is available. The region also has the highest variability of precipitation in the world. Moreover, with the population expected to grow from around 300 million today to around 500 million in 2025, per capita availability is expected to halve by 2050 -Worldbank, 2009*

## The Middle East water crisis

The Middle East, home to 6.3 percent of the world's population and containing only 1.4 percent of the world's renewable fresh water, is experiencing an increasing water scarcity crisis.[1] The UN presented an alarming report during the last World Water Forum in March 2009 painting a bleak picture of increasing demand and diminishing water supplies.[2] Scientifically, the Middle East ran out of water in the 1970s, by then the overall demand for water was more than the resource could provide. A situation affecting millions of individuals.[3] The Middle East is the most water-scarce region in the world.[4] In 1955, three Arab countries suffered water scarcity; today, that number is eleven and scholars predict seven more nations joining the list by 2025.[5] While population growth plays a huge role in the increased demand, the agricultural sector accounts for more than 70 percent of water use throughout the region. The introduction of pumpwells and massive irrigation schemes nearly doubled the amount of irrigated land between 1965 and 1997.[6]

## Water Scarcity and Examples of Cooperation in History

All six of the main rivers in the Middle East (the Euphrates, the Tigris, the Jordan, the Nile, the Litani and the Orontes) have played crucial roles in the

**Joshka Wessels** is a Dutch human geographer and filmmaker with a PhD in Development Studies and a special focus on water and the Middle East.

development and sustainability of great civilizations. Each river basin has its own particular characteristics and specific riparian states. Riparian states are states connected by the fact they share a water resource like a river or a groundwater aquifer. Example is the Jordan-Yarmouk river basin that is shared by the riparians Lebanon, Syria, Jordan, Palestine and Israel. Therefore, it is impossible to approach the Middle East as a whole in terms of hydrology and hydropolitical features.[7] The overwhelming common denominator in all six basins, however, is the potential of water body management to foster peace and stability in the region. Managing the water supply in the Middle East has always been an integral part of ensuring stability of communities, districts, regions and countries.

For thousands of years, the Middle East has been an arid region, and human survival in a desert environment is only possible if the water supply is guaranteed. The small village of Shallalah Saghirah, for example, is located at the edge of the Syrian desert with only one lifeline, an ancient tunnel hand-dug and dating back to the Byzantine era, which provides water for drinking and irrigation.[8] The tunnel is called a qanat Romani in colloquial Syrian Arabic. Lightfoot defines qanat as

> *a form of subterranean aqueduct- or subsurface canal- engineered to collect groundwater and direct it through a gently sloping underground conduit to surface canals which provide water to agricultural fields.*[9]

Qanats originated in the Kingdom of Urartu.[10,11] Still today, archaeological evidence lacks a comprehensive theory on the origin and diffusion of qanats. The scientific debate centers around the pattern of diffusion and the role of the Persian Empire in the spread of the technique.

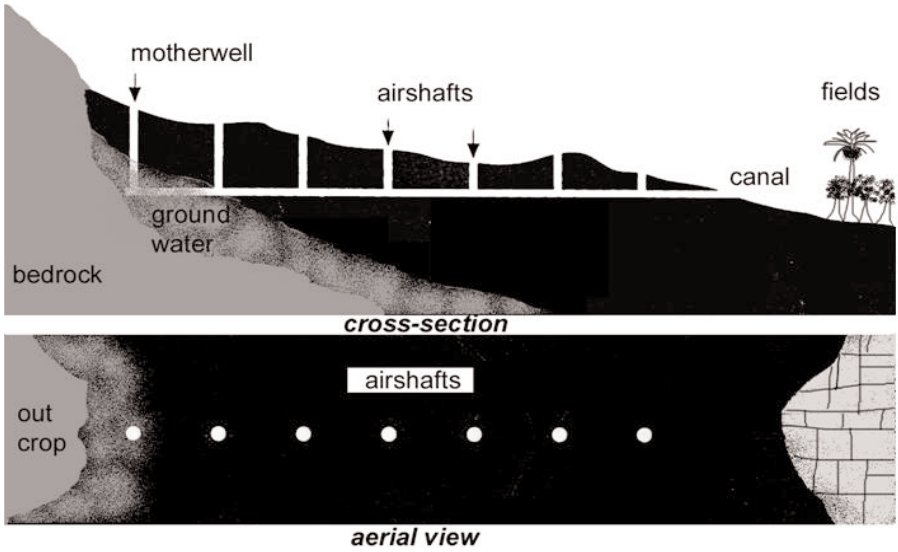
In Syria, many ancient qanat irrigation systems have been abandoned due to falling water tables caused by the increased use of modern electric and diesel-pumped wells. In modern times, qanats have not been able to provide enough water for large-scale agriculture. Qanats must be cleaned on a regular basis to prevent silting, collapsing, and malfunctioning. Cleaning helps keep the qanat flowing even in dry seasons. The labor intensive upkeep and relatively low water output make qanat farming unattractive to people today who are increasingly drawn to off-farm work and urban living. This results in the abandonment of qanats and the disappearance of indigenous knowledge and community co-operation critical for qanat upkeep.

The disappearing qanats means valuable cultural heritage is also vanishing. Not only are qanats relics of a prosperous past but also a potentially sustainable and environmentally friendly system of extracting groundwater. In Qarah, Syria, ancient qanats used in combination with modern drip irrigation systems for fruit trees might prolong the life of some qanats and encourage younger generations to commit to their upkeep. Another option for rescuing the deteriorating qanats is to encourage eco-tourism based around qanats to provide alternative income for the farmers.

In 1999, the qanat of Shallalah Saghirah still flowed after nearly 1,500 years. Minor maintenance had ensured a continuous flow of water even in the driest periods. The area around Shallalah Saghirah has always been an arid region with long

periods of drought punctuated by years of rain. The qanat is the outcome of ingenuity and adaptation to cyclical drought and scarcity, making it a prime example of how water scarcity can force people to work together sustainably. Despite centuries of continuous flows, by 2000 the tunnel of Shallalah Saghirah had severely deteriorated because it had not been maintained since the 1980s.

**Cross-Section of a Qanat in the Desert.**




Fortunately, the Shallalah Saghirah qanat has not been completely abandoned. The inhabitants of the village are descendants of a common ancestor, and until 1965 the entire extended family lived in the village. As the group grew too large for the land, the strain on resources drove some people to leave the village in 1970. Economic pull and familial infighting drove some of the families to urban areas like Aleppo and Raqqa, following the mass movement in Syria. The migration of some, however, did not mean that those left in the village could return to a completely qanat-fed farming system. The villagers eventually adapted to different types of income generation, whether on-farm or off-farm.

The movement from Shallalah Saghirah opened communications with the cities of Aleppo and Raqqa and various surrounding villages. The social mobility created by international labor migration connected the village to nations such as Lebanon and Saudi Arabia. Unfortunately this hurt the economic vitality of the village because targets for labor such as sheep shearing also shifted to Saudi Arabia, while construction jobs for young individuals shifted to Lebanon.

## Following the Example from the Past, Working Together to Clean the Qanat of Shallalah Saghirah

In 2000, I led a project aimed at cleaning and rehabilitating the qanats of Shallalah Saghirah. Several focus group meetings were held with the Haquun, a group of seven main heads of household in the village who own all irrigation rights. They are all blood related descendants of one great-great grandfather. A familial dispute initially made it difficult to get all seven Haquun together. It quickly became clear that the disputes between different lineages affected water management.

**Not only are qanats relics of a prosperous past but also a potentially sustainable and environmentally friendly system of extracting groundwater.**

Several focus group meetings were held with the Haquun willing to cooperate. The ongoing dispute between the Haquun had little to do with the qanat itself, and they gradually came to an agreement on the technical work plan. The Haquun decided that the villagers themselves should do the cleaning work and prioritized activities for the renovation using indigenous terms for the important parts of the qanat. Because the water production section of the qanat is of direct benefit to the Haquun, was their first priority of cleaning. If the qanat dries up, the village will have to evacuate.

The use of rubber pipes for irrigating personal plots outside the rotation system was also a subject of dispute. The villagers used rubber pipes as siphons to draw water from the open canal. This was allowed throughout the day for personal use, however siphoning for irrigation purposes should be done according to the agreed upon rotation system. Villagers accused each other of using these pipes for irrigation without following the correct rotation system.

The combination of these disputes, ambivalence to the qanat and the exodus of young workers to urban areas created a tense situation for the village. The village did not have a single leader and the family did not solve disputes immediately. Weak leadership disrupted regular maintenance of the qanat. While the Haquun quarrelled, the younger men became engaged in migrant work to earn money for their weddings. Despite the latent constraints and reluctant attitudes, there was a general willingness to clean the qanat and this was expressed in the focus group discussions. Also, some younger men became more and more interested as the discussions and fieldwork progressed. But after some time, it was evident that without getting all the Haquun together, the cleaning would not take place at all.

The presence of our scientific team and the many group meetings had apparently stimulated the Haquun to settle their differences. Therefore, another focus group meeting was planned, this time with all Haquun present. They agreed to an informal, written agreement regulating the maintenance and renovation work of the qanat. This agreement set down explicit regulations for the use of rubber pipes to extract water. Then the Haquun made a list of all workers available for the cleaning and their schedules. This was in an effort to accommodate the seasonal

migrant work the young men were economically dependent on. Also, it was decided that the Haquun would form a committee representing village interests and guiding the younger representatives that were elected. With this agreement and a technical work plan including a budget, the committee and researchers initiated a search for funds necessary for cleaning and renovation.

After developing a research proposal based on the outcome of the group meetings, funds were granted by the Dutch and German Embassy in Damascus and cleaning work started on June 17, 2000. The village committee assembled a group of workers and chose a supervisor from the village community. The work plan was followed and the supervisor made a weekly work program with names of the workers. Although the work was done withint the community, the cleaning activity was officially regarded as an archaeological excavation since it officially concerned a Byzantine site. As a procedure, a representative of the Aleppo Museum was appointed to oversee the cleaning in case we would find any antique artefacts during the work. Indeed we did find one oillamp that was later identified as originating from the late 6th century AD.

The first stage of cleaning the opening to the qanat tunnel proceeded quite smoothly; team spirit was high and work progressed. After six weeks however, enthusiasm waned. After a dispute between the elected supervisor and some group members, the supervisor relinquished control of the work schedule to the government representative of the museum. This was done and everything was back on track again.

One month before the proposed final project date a relation of the Haquun returned to the village from migration work in Lebanon with the intention of renewing an old honour dispute. This resulted in an open fight with throwing stones and pulling guns. No shooting occurred, but some workers were arrested and put into jail. The group split into two factions and work halted until the problems could be resolved. This proved to be a lengthy process, spanning twenty-two days. Most importantly, the jailed workers needed to be freed before work could resume. All parties involved adamantly protested the involvement of the Syrian police and formal judicial system in the reconciliation process. This united the workers towards a resolution.

After the workers were released from jail, reconciliation began in the village. The villagers brought in a family mediator in the form of the much respected farmer who provides the villagers with work during the summer season. This farmer and his entourage came to Shallalah Saghirah to resolve the issue between the quarrelling parties. The first attempt at negotiations over disagreements on payment and blame were unsuccessful. The family mediator left the village without being able to bring peace between the parties. But he did provide assistance in finding an outside mediator to assist in the conflict resolution. Eventually the conflict was solved with the help of a Bedouin tribal judge, a so-called áaraf and the qanat cleaning could continue. The camaraderie, however, had deteriorated significantly. The work was completed on September 16, 2000.

Eight years since the restoration, the village of Shallalah Saghirah still remains largely dependent on water from the qanat. The different factions within the village have managed to live together in relative peace and work together to maintain the water supply. The case of Shallalah Saghirah is an example of how scarcity affects the daily lives of rural people in the Middle East. The dispute over the use of siphons in Shallalah Saghirah was a direct result of competition for water. It demonstrates how water is a crucial element in a cycle of internal conflict within the communities. However, the community of Shallalah Saghirah managed to rehabilitate their water tunnel and the water is still flowing. This illustrates that the urge to work together gained momentum in the final stages of the rehabilitation of the qanat. The culture of 'an eye for eye' somehow changed and in place of outright conflict, other solutions were reached. But is the case of Shallalah Saghirah an example of how hydropolitics works at higher level? Could a move away from agriculture be part of the overall solution of the Middle Eastern water scarcity challenge? A change in economy and culture?

## Change politics, the Culture or the Economy to Avoid Looming War?

The fact that the Middle Eastern water supply has been severely limited since the 1970s has not yet lead to a full-scale water-related regional war; the tensions between riparian regions are definitely evident and violent clashes have occurred at the local and regional levels, specifically in Egypt and Libya. Also, Turkey and Syria have a delicate relationship due to the shared riparian regions of the Euphrates and the Nile and a good share of tensions between these states exist. The Jordan River basin has been a continuous source of conflict between its five riparian nations: Lebanon, Syria, Jordan, Palestine and Israel. Water is central in the Palestinian-Israeli armed conflict as is the dispute between Syria and Israel over the Golan Heights. To quote German hydro-geologist Clemens Messer-Schmid,

> *Wherever Israel is located down river; it uses military force to ensure that most water that flows in that river will reach Israel. It takes over the Golan, it threatens war, and in the West Bank it uses military orders to prohibit the drilling of wells. What's going on here is not cooperation, but the dictation of an unequal division. Just imagine if Holland were to force Germany not to use the waters of the Rhine."*[12]

The Israeli attacks on Lebanon can be linked to Israel's desire to capture the Litani and Hasbani basins and the Lebanese attempts to use the water of the Hasbani River for its own needs.[13] When President Emile Lahoud announced in 2002 that Lebanon planned to pump 315 million cubic feet of water a year from the Wazzani/Hasbani River, Israeli Prime Minister Ariel Sharon warned that this would be grounds for war.[14] During the 2006 attack on Lebanon, the Israeli Defense Forces targeted waterworks, irrigation pipes, and open channels from the irrigation system connected to the Litani River in southern Lebanon.

The latest incident of water related conflict is the most recent Israeli attack on

Gaza. Israel carried out Operation Cast Lead from December 27, 2008 until January 18, 2009.[15] The Palestinian Water Authority assessed the damage done to water infrastructure and concluded that twenty-two days of continuous offensive from air, land and sea not only caused major humanitarian losses but also huge damage to Gaza's water infrastructure. The North Gaza Emergency Sewage Treatment Plant project was subjected to intensive bombardment leading to huge environmental damage. A number of main water supply lines were damaged severely during the attack on Gaza, leaving many families without proper water supply through the spring of 2009.

The competition for water may be grounds for full-scale war and conflict in the short term. In the long-term, the outcome of war over water is detrimental for all parties involved. In terms of a shared ecology and ecosystems approach, the only way forward is to find a sustainable solution to water scarcity—a process that must involve cooperation and coordination between communities. The population of the region is growing but the water supply is not increasing. As the ancient qanat builders understood, the aquifers cannot provide more water than what it is capable of recharging. Another option, the desalination of seawater, if even a viable option, can cause environmental damage by introducing large amounts of water into a fragile ecosystem and may not be a sustainable solution. According to Clemens Messer-Schmid's, "As a hydro-geologist, desalination here, and everywhere else in the world, is a great absurdity: it's crazy to use nonrenewable resources that were created millions of years ago in order to manufacture the most mobile element in the universe–water."[16] Therefore we must find alternative solutions.

**Middle Eastern nations need to diversify their economies and import more food, growing less of their own wheat thereby utilizing less water resources on agricultural production.**

Solving the water scarcity problem lies mainly in managing demand. Most of the water demand comes from irrigated agriculture, which should be heavily reduced or even nullified. This would mean a major shift from subsistence agriculture to a more diversified economy. Today most of the economies of Middle Eastern countries like Egypt and Syria are based largely on agriculture. Tony Allan of King's College London, drawing on virtual water theory, believes that moving away from agriculture is the only way for Middle Eastern countries to solve their water scarcity and distribution problems. Water currently used in food production could help be used towards restoring the water balance in the region. For this to occur, Middle Eastern nations need to diversify their economies and import more food, growing less of their own wheat thereby utilizing less water resources on agricultural production. "The major driving force that will lead to the transformation and reform of water policy and management in the region is progressive socio-economic development."[17] This option is not feasible any time soon as the largely agricultural lifestyle continues to heavily influence Middle Eastern political bodies. Even if it were possible to change the role of agriculture, it poses an ideological problem as relying largely on

food imports is difficult for many contemporary governments to justify.

Water scarcity is highly a product of the human use of water for agriculture. The water crisis, Messer-Schmid asserts, is man-made. Israel uses over sixty percent of its water for agriculture, which is important to maintain the national ethos of a Jewish state. Unfortunately, this also means that the country uses significantly more water than Palestine. Average Israeli water usage amounts to 240-280 liters of water per person per day while Palestinians in the West Bank only consume 60 liters In some places in the West Bank, the supply is only sufficient for 15 liters per person per day. According to Messer-Schmid, this is due to poor distribution and not drought or natural scarcity.

The Occupied West Bank is not the dry desert arid country commonly portrayed. In fact, annual rainfall in both Berlin and Paris is less than in Jerusalem and Ramallah.[18] Most of the rainwater that falls in the Occupied West Bank, however, flows directly into Israel. The grain of the truth according to Messer-Schmid is that Israel is acting to deprive Palestinians of their water resources.

Considering the global economic crisis, long-standing cultural traditions, and regional disputes, countries are not likely to instigate dependency on food imports. Moreover, the large number of farmers dependant on agriculture, would cause a social uprising if import dependence was implemented into governance. Despite the unlikely economic shift, the water crisis is not going to stop; it will only grow as population levels rise.

Another potential way to deal with the water crisis is changing the management approach and linking water demand to management. The following section will give an example of EU-initiative on water governance called EMPOWERS that piloted in Palestine, Jordan and Egypt. It focused on local water governance; examining local and micro-level solutions to solve regional and macro-level problems.

## The Introduction of New Forms of Water Governance at a Grassroots Level – the Example of EMPOWERS in Palestine

The EMPOWERS project was implemented between 2003 and 2007 within the framework of the EU-funded MEDA-water program in the East and West Mediterranean region. Piloted in Egypt, Jordan and the West Bank,[19] the project was based on the philosophy that problems of water scarcity, water rationing and unequal distribution can only be solved if the responsibilities of water governance are shared. For example in the Jordanian village of Damia, the end-users were complaining that the service provider never attended to their calls of broken water pipes. The hierarchical distance between the users and the providers was big and prevented equality of cooperation. EMPOWERS brought the users together with the providers to find solutions for the poor distribution of the resource.

Traditionally, Middle Eastern countries manage their water resources from the top down. The EMPOWERS approach promotes management of water resources from the bottom-up. By involving end-users of water in the decision-making process

concerning the water supply and facilitating dialogue with water service providers, the EMPOWERS approach aims to improve local water governance and create a just and equal distribution of scarce water resources.

The MEDA-water program is a large EU-funded program based on the principles of local level water management. A total of €36.5 million was spent in implementing nine projects in the countries of the Mediterranean region between 2002 and 2007. It was geared towards the introduction of innovative water management approaches in the Middle East. The use of participatory approaches, empowerment of end-users, decentralization of water management, and changing the culture of hierarchy pervaded the themes of most of the project. Project leaders and coordinators from all countries in the Middle East actively implemented these principles in the region.

> *Local water governance in the sense of EMPOWERS is about new policies, platforms, networks and institutions. Making this work is about people. People challenging the traditional way of how things "ought to be;" people who do things differently with a bit of courage.*[20]

For successful implementation of the EMPOWERS approach, organizers must facilitate the twin processes of stakeholder dialogue and collective action (SDCA).[21] A cyclic process including problem identification, vision development, scenario development, raising awareness, and stakeholder analysis ensures parties work together to find constructive solutions to common water problems. Vision development plays an important role in bringing the main stakeholders together and in ensuring that the discussions and the water management strategies and plans focus on priority problems.[22]

The EMPOWERS project recognized that changing a traditional system is not a complacent and simple process. Empowering end users and incorporating them into the decision-making process will upset established power balances. The driving principle behind the EMPOWERS approach is that "water stakeholders" work together as equal partners in finding solutions to water problems at the local level. The philosophy is that finding and implementing these solutions will eventually lead to solving problems at a wider level. The question is whether the EMPOWERS approach will also work at a regional level.

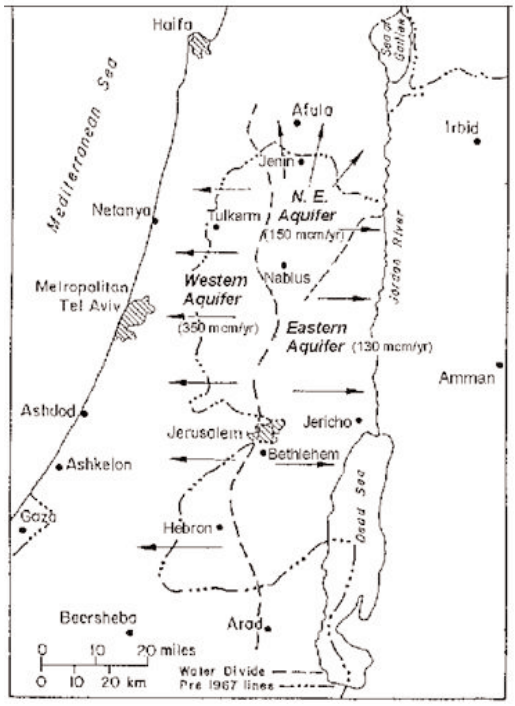
## The Increasing Water Problem in the Middle East: an Opportunity for Democratization, Cooperation and Peace or a Source of Conflict?

Many water experts and professionals in Israel vehemently oppose cooperation with the Palestinians on the basis that the cultures are too different, communication is too difficult and there is no trust between the parties.[23] These fears are very similar to the first reactions of the Haquun in Shallalah Saghirah. They, too, believed strongly that cooperation was impossible. The EMPOWERS approach has the potential to foster democratization, cooperation and peace in the Middle-East by

overcoming these fears. Currently water is a source of conflict and not cooperation.

Yousef Awayes of the Palestinian Water Authority (PWA) subscribes to the view that the Israeli government is controlling the most important Palestinian water resources. The Israelis leave the Palestinian Authority with less than a quarter of the water supply that originates in Palestine. Israel's military and political power allocates the majority of aquifer use to the needs of the Israeli state. They do not see Palestinians or the Palestinian Authority as potential partners in integrated water management. Instead, the Palestinians are seen as burdensome consumers for the development of Israel.

**Figure 1**




Source: Friends of the Earth Middle East

However, a handful of cross-cultural projects are already setting the precedent for Israeli-Palestinian cooperation. Gidon Bromberg of the organization Friends of the Earth Middle East and his Palestinian counterpart Nader Al Khatib work together to protect the water supply for both regions. They stress that the current seepage of untreated sewage from the Mountain Aquifer (see Figure 1) into Israeli territory illustrates the shared nature of water resources. They view this seepage as a

ticking time bomb. Sewage from more than 2.5 million people—Palestinians and Israeli settlers—constantly flows untreated into a valuable recharge area.[24] This is critical and the only viable long-term solution is joint management.

The prospect of water management appears bleak so long as Israel and Palestine continue to refuse to work together. Changing Israeli consumer patterns towards a fairer pattern of water distribution is the only way to deal with the water problems with a lasting impact. The PWA has instituted a pilot project for water management development based on the EMPOWERS framework.

From an ecological perspective, the current water situation in the Middle East will force Israel and Palestine to work together to solve water supply and sanitation problems. The methodology has been established and the EMPOWERS project stands as a model for change. Future generations must expand productive dialogue about water management to solve the water crisis. Local-level management and hydropolitics, as seen in Shallalah Saghirah and in the EMPOWERS project, have shown that cooperation is indeed possible. A common vision for solutions to water scarcity and distribution problems is evolving worldwide.

## Conclusion

Water in the Middle East is political and the challenge for effective and beneficial management lies in convincing politicians of the solutions to save water. In fact, the technical solution to solve the water demand crisis lies mainly in just consuming less water in agriculture. Expensive desalinization is not always necessary if water users can work together managing the water demand and curtailing the amount of water that irrigated agriculture requires. However, a long history of mistrust perpetuates competition between and hampers cooperation in governance; whether it is sharing the Nile or Euphrates basin, using a common qanat tunnel, or sharing a water supply system such as the Mountain Aquifer between the Palestinian West Bank and Israel. In the case of the Palestinians, they have been unable to develop their own water resources since the occupation in 1967. The acknowledgement of their right to shared water resources is the main condition of starting to work on an EMPOWERS-based approach in the region. With the new hard-line Israeli government headed by Benjamin Netanyahu, a divided Palestinian Authority, and the recent atrocities in Gaza still fresh in people's minds, it remains to be seen whether water cooperation in the short-term is at all possible. However, with increasing climatic change, peace and cooperation on water management at all levels is the only option in the Middle East to avoid a natural catastrophe.

Case studies at the local level have shown that an aversion to crisis can occur provided that actors can facilitate constructive dialogue and motivate people to work together. Opposing parties must create a common vision. It remains to be seen whether these sparks of change at the local level will ignite cross-cultural cooperation.

## Notes

[1] Roudi-Fahimi (2002).
[2] Dorian Jones, "Expert Says Days of 'Easy Water' Are Over," Istanbul. March 17, 2009, Available at: http://www.voanews.com/english/2009-03-17-voa13.cfm.
[3] A.T. Allan, "The Middle East Water Question, Hydropolitics and the Global Economy", 2002, I.B. Tauris.
[4] F. Roudi-Fahimi, L. Creel, and R. De Souza, "Finding the balance: population and water scarcity in the Middle East and North Africa, (2002), http://www.prb.org/pdf/FindingTheBalance_Eng.pdf.
[5] Worldbank (2009).
[6] The World Bank, "Dealing with Water Scarcity in MENA." Available at: http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/MENAEXT/0,,contentMDK:21872903~menuPK:247603~pagePK:2865106~piPK:2865128~theSitePK:256299,00.html
[7] O. Bilen, "Turkey and water issues in the Middle East", 2009, DSI, Turkey
[8] J.I. Wessels, "To cooperate or not to cooperate…", PhD thesis, University of Amsterdam, 2008.
[9] D. Lightfoot, "Syrian Qanat Romani: History, Ecology, Abandonment," *Journal of Arid Environments.,* 1996.
[10] P. Briant, "Irrigation et drinage dans l'Antiquite, qanats et canalisation souterraine en Iran, en Egypte et en Grece, seminaire tenue au college de France sous la direction de Pierre Briant," Thotm editions, 2001.
[11] H. Goblot, "Les qanats, une technique d'acquisition de L'eau, ecole des hautes etudes and sciences sociales centre de recherches historiques," (Mouton Editeur, 1979).
[12] A. Hass, "Water, water everywhere" Interview with Clemens Messer-schmid, *Haaretz Newspaper*, (March 7, 2008).
[13] Angela Joy Moss, ICE Case Studies, ICE Case Studies, Number 14, "Litani River and Israel-Lebanon." Available at: http://www1.american.edu/ted/ice/litani.htm
[14] R. Fisk, "Water war looms as Israel tells Lebanon to halt river works," *Independent/UK*, (September 26, 2002), Available at: http://books.google.com/books?id=v5auXCkTw7UC&pg=PA88&lpg=PA88&dq=hasbani+israel+war&source=bl&ots=cJP7-N1bco&sig=ZOg3f2MBvMKQxX7H9V2K0Bzyjyo&hl=en&ei=kRLaSdW3J5ac-gaLoP23Bw&sa=X&oi=book_result&ct=result&resnum=3#PPA91,M1; http://www.unep.org/cpi/briefs/Brief16Sept.doc#Lebanon
[15] NFP Palestine, Euro-Mediterranean Information System on the Know-How in the Water Sector. Available at: http://www.emwis.pwa.ps/etemplate.php?id=42
[16] A. Hass, "Water, water everywhere" Interview with Clemens Messer-schmid, Haaretz Newspaper, (March 7, 2008).
[17] A.T. Allan, "The Middle East Water Question, Hydropolitics and the Global Economy," (I.B. Tauris, 2002).
[18] A. Hass, "Water, water everywhere."
[19] Abu-Elseoud et al. "Doing things differently, stories about Local Water Governance in Egypt, Jordan and Palestine",2007, MEDA-Water, EMPOWERS, INWRDAM, Jordan.
[20] The EMPOWERS Approach to Water Governance, MEDA-Water, EMPOWERS, INWRDAM, Jordan, 2007.