BLED DRY

HOW WAR IN THE MIDDLE EAST IS BRINGING THE REGION'S WATER SUPPLIES TO BREAKING POINT. AN ICRC REPORT.

ICRC

REPORT

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Front cover: ICRC

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Even without recent droughts and ongoing conflicts, many Middle Eastern states would be struggling to meet the basic water needs of growing urban populations and demand from rising food production.

But the conflicts in Syria and in Israel and the Occupied Palestinian Territory, as well as the aftermath of conflict in Lebanon and nearly three decades of war and sanctions in Iraq, have helped push the region's water resources and delivery systems close to breaking point, according to the International Committee of the Red Cross.

Throughout the Middle East people are suffering from severe water shortages, which not only hinders agricultural production but also places limitations on domestic supply. The rising violence of the past few years and record-low rainfall have made access to an adequate quantity and quality of water increasingly difficult. In Syria for instance, the combined effects of a protracted conflict and consecutive drought years have hit many people very hard.

Many of the aging water supply, sanitation and electrical systems that service the region's growing population were already struggling to keep up with demand even before the conflicts began. Now with more than 7.5 million people displaced within Syria and some 4 million seeking safety elsewhere (mostly in neighbouring Iraq, Jordan, Lebanon and Turkey), along with another 2.5 million displaced due to fighting in Iraq, already fragile water systems in communities hosting the displaced people are being pushed to the limit and water quality continues to deteriorate. In Yemen dwindling water supplies and years of civil war have had serious effects on food production and the local economy.

"In countries like Iraq, Syria, Jordan, Lebanon, Yemen, or in the occupied Palestinian territory (East Jerusalem, West Bank and Gaza), a lot of the infrastructure is very old," says Michael Talhami, ICRC Regional Water and Habitat Advisor for the Near and Middle East. "And because of prolonged periods of conflict, or in some cases sanctions, or due to a lack of investment, the necessary maintenance or rehabilitation of these municipal systems have been neglected. Many of these water systems, therefore, are extremely inefficient — a lot of water is simply lost due to leakage in the water supply system."

Heavy fighting using high-intensity, explosive weaponry means that many water, sanitation and electrical systems have suffered regular and serious damage. This has meant that access to water has continued to decrease both in terms of quantity and quality. The rate at which water is lost due to damage to these systems continues to increase in many cases. Thus, even more of this precious resource is squandered, while waste water treatment is often forgone.

The cost of water is also rising in many cases. This is due either to municipal service providers having to run generators to make up for the lack of access to the electricity network. Or it is the result of people having to purchase water from private vendors who sell water from trucks.

The ICRC has also observed a disturbing trend in which water supply, sanitation and electrical infrastructure are being directly targeted by warring parties. In other instances, parties to a conflict that have control over essential service infrastructure are using access to water and electricity supply as tactical weapons or as bargaining chips in negotiations.

"Using access to water as a tactic or weapon during conflict, or targeting water or energy facilities, creates immediate and long-term, negative impacts on public health for already very vulnerable populations," says Robert Mardini, ICRC's head of operations for the Near and Middle East.

ZOUBAIDI, W./CRC

"Such attacks are particularly harmful because water, sanitation, and energy supplies are intimately interconnected. So an attack on an electrical station, for example, could have an impact on sewage treatment, water availability, the quality of available water, or the functioning of health facilities. If this trend continues, the humanitarian community will not have the capacity to meet the populations' needs by substituting services or by continuing to offer quick-fixes."

IBRAHIM, Maan/ICRC

LONG-TERM HEALTH AND HUMANITARIAN CONSEQUENCES

All these trends have devastating consequences for people who live in areas where few alternatives exist for gaining access to a sufficient quantity and quality of water. In many cases the arrival of large numbers of refugees or internationally displaced persons has worsened an already existing water scarcity crisis.

Many Syrian refugees, for example, have had little choice but to gather in camps or in host communities where water resources were already scarce, of low quality, or expensive. In some cases, such scarcity is one of several issues creating tensions between the displaced and those hosting them, while in other cases it adds to mounting social grievances for which local authorities or government are blamed.

MAIN CHALLENGES

The challenges are common to most countries of the region, particularly those now coping with expanding refugee populations or large movements of people within their borders due to fighting. Here are some of the other main issues that require immediate international attention and support:

- **Municipal service provision in host communities is severely strained and already scarce water supplies are stretched to the maximum.**

- **The increase in demand for water has resulted in over pumping, which has in turn led to declining water table levels, higher pumping costs and increasing salinity.**

- **The size and scope of urban water supply, sanitation and electrical systems requiring maintenance and repair have greatly increased. These large systems demand greater investment of time and resources to maintain, during times of stability and of conflict. At the same time in protracted conflicts there is all too often a brain-drain of skilled staff.**

- **Energy shortages, intermittent supply and severe fluctuations in the voltage of the power supply place significant constraints on the operation of municipal water and sanitation systems. Therefore, less drinkable and domestic (household) water is available and less wastewater is actually treated.**

- **Lack of adequate power supply means local authorities must increasingly resort to using generators, which raises the costs of water. As municipal services decline and economic hardship sets in during prolonged periods of conflict, people tend to forgo payment for such services as water, sanitation and electricity. As a result service providers have less revenue to make necessary repairs and perform routine maintenance.**

- **Growing household (or domestic) water consumption by the region's rising population has meant more water is diverted from the agricultural sector, which is already under threat due to conflict. This leads to over-extraction of water resources to meet the demands of agricultural and domestic use. This damages the sustainability of water resources. Consequently many Middle Eastern countries are increasingly reliant on importing food commodities, leaving local residents and refugees more vulnerable to fluctuations in international market prices.**

- **There is a general lack of respect among warring parties for the protected status of water installations. The ICRC has observed a troubling trend in which water and sanitation infrastructure is being destroyed, either through deliberate targeting, or as a result of collateral damage, as well as in some instances water infrastructure being used as a political or military bargaining chip. International Humanitarian Law clearly prohibits, whatever the motive, the attacking, destroying, removing, or rendering useless of "objects indispensable to the survival" of civilian populations, such as "foodstuffs, agricultural areas for the production of foodstuffs, crops, livestock, drinking water installations and supplies, and irrigation works."**

- **Fighting poses continuing challenges to our ability to reach the areas needed to ensure access to essential services (water, sanitation and energy) that are critical to maintaining public health.**

- **Support in terms of water, sanitation and habitat is greatly needed in all of the conflict affected countries as well as those countries where people have sought refuge from the conflict in Syria.**

WHAT WE CAN DO ABOUT IT

Despite the dire situation, there are positive steps that can be taken:

- **With sufficient resources and coordination with local water authorities, considerable improvements can be made to existing urban services (water, sanitation and energy) that could greatly improve access to an adequate quantity and quality of water.**

- **By working with local partners such as the Red Cross and Red Crescent National Societies, as well as local service providers of water, sanitation and energy in all of the affected countries, the ICRC has made considerable progress in addressing some of the most serious needs, and in developing dialogue with all parties to the conflict.**

- **There have been numerous cases in which the ICRC has observed that warring parties have respected the civilian infrastructure and proper operation of essential services. This indicates there are opportunities for productive engagement aimed at fostering greater respect and understanding around this issue.**

What we are doing about it:
ICRC water-related action in the Middle East by the numbers

9.5 million: Number of people in the region who benefitted from emergency repairs and rehabilitation of water supplies in 2014.

600,000: Number of people in the region who received water delivered by trucks and provided by the ICRC in 2014.

1.1 million: Number of people who benefitted from improvements to water storage or water distribution facilities.

A DESERT REGION WITH A GROWING POPULATION

Nowhere on earth is the intersection between conflict and water more evident than in the Middle East. Even before the conflicts of recent decades, water use was already at unsustainable levels in many countries in the region.

"This is an area that relies a lot on agriculture and food production and demands a lot of water," notes Guillaume Pierrehumbert, ICRC water and habitat coordinator in Israel and the Palestinian Occupied Territory, who has worked in several countries throughout the region. "It's not just about the water for drinking, which represents just a small quantity of the needs."

Over the years the populations of most countries have grown rapidly, while peoples' expectation about the quality of services has also risen. As it has in other water-stressed regions, this created competition over access to water between sectors (agriculture versus domestic, and/or urban versus rural).

In many water-rich countries, agriculture makes up 80 to 90 percent of total water use. With sufficient water available, they can direct a high percentage of water toward growing crops while still having enough for domestic consumption.

Most water-poor countries, however, can only allocate 50 to 60 percent of their water resources to growing food. "As their populations grew, they either had to re-allocate water from the agricultural sector to the domestic sector to meet the domestic water needs or run the risk of over using their already scare water resources," Talhami notes.

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VIRTUAL WATER

This leaves water-poor countries vulnerable during times of drought and conflict. “Countries in this region have increasingly made up for their water deficit by importing food commodities that are grown with water elsewhere, typically in water-rich countries,” says Talhami. “This is commonly referred to among water experts as ‘virtual water.’”

This trend is aggravated by conflict and climate change in the region. A case in point has been the recent drought, which had a dramatic impact on wheat production in Syria. “Wheat is primarily grown in rain-fed areas in the north-eastern part of Syria,” notes Talhami. Last year, due to conflict and drought, wheat production was low. “This means that Syria could become even more reliant on imported food, and will therefore be acutely vulnerable to any spike in world food prices, which would exacerbate the difficulties many people already face as they try to obtain food at a price they can afford.”

Meanwhile, successive drought, unsustainable water management practices and increased urbanization in countries such as Syria have also placed at risk the sustainability of water resources and the ability to meet the mounting need for both water and food. “As an example, there was a river that used to flow through Damascus, the Barada river, which was feeding the entire city until the 1960s and 70s,” noted David Kaelin, ICRC water and habitat programme coordinator for Syria.

“Because Damascus increased its population even more than the rest of the country, probably 10 times over the past 60 years or so, along with use of this water for agriculture, the river literally stopped flowing,” Kaelin says. “There is hardly any water flowing in the Barada river in Damascus. Almost the entirety of this water was used before the crisis for the population and for agriculture.”

In the meantime, the city’s main wastewater-treatment facility, situated on the front lines between the warring parties, is severely damaged and no longer operating. This greatly enhances the risk of groundwater contamination, which in turn could pose a serious threat to public health.

“So in Syria today there is demographic pressure, a water-scarce environment and climatic events all coming together,” says Kaelin. “And you top it off with a very intense, widespread conflict that touches every part of the country, and what you have is a recipe for disaster.”

The water crisis in Syria is not exceptional in the region. “Water can play an indirect role in exacerbating existing conflicts, tensions or social grievances,” says Talhami. “For instance, during the political upheavals of the so-called ‘Arab Spring,’ water-related issues formed part of a complex set of variables that ultimately lead to the civil unrest”.

SYRIA: BRINGING WATER TO PEOPLE IN DESPERATE NEED

Effects of conflict: Water in Syria

- *In 2014, local officials estimated they lost 60 percent of water supply due to leakage in the network due to damage caused by the conflict as well as the lack of proper running and maintenance of already aging infrastructure.*
- *Damage to water, sanitation and electrical infrastructure is widespread.*
- *There is a risk of severe health consequences due to a lack of access to a sufficient quantity and quality of water as well as exposure to untreated wastewater.*
- *Maintenance and rehabilitation of essential infrastructure proceed slowly due to the lack of safe access for humanitarian workers, service provider technicians and contractors.*

At a centre for people displaced by the fighting in the governorate of Sweida, in Syria's southern tip, Ibrahim Taih Assaadun, says he has come all the way from the northeastern governate of Hassakeh to escape the fighting.

But life at the centre where he has temporarily settled is still extremely hard. "We lack everything, especially water," he says. "We have to pay for water, except when it is on free distribution, but that's not enough for 350 people."

In centres like this one, the Syrian Arab Red Crescent (SARC), a key partner in ICRC actions within Syria, have recently completed an assessment that led to the installation of several water tanks in order to increase the storage capacity of drinking water.

"There is mutual respect and trust between the Syrian Arab Red Crescent and the ICRC," says Reem Alamer, a SARC volunteer who is working on the project. "The ICRC depends on the information gathered by our teams. During our visits to the displacement centres that we support, especially when it comes to water, following our assessments, the solutions we suggest are put into practice."
(To see a video about ICRC and SARC water operations, click here)

This is just one example of how the ICRC works with SARC and other partners, including local power authorities and water boards, to take thousands of steps — large and small — in communities and centres for displaced people throughout the country. "By working alongside the Syrian Arab Red Crescent and by providing training on water and habitat in emergencies for their volunteers as well as support to the local water boards, we are improving access to clean water for millions of people all over Syria,» says Talhami.

A MASSIVE DEMAND

But in a nation where upwards of 7 million people have been displaced to other parts of the country, and the damage and neglect of infrastructure is so extensive, these humanitarian activities cannot keep up with demand. "The war is putting everything under pressure," says Kaelin. "The very tricky management of what were already very scarce water resources, which was handled in a very secure and careful way before the crisis, is now down the drain. Now we're in a very critical emergency situation."

It's an uphill fight as water authorities are often forced to meet greater demand with severely damaged networks, which in some areas lose more water to leaks than they are able to deliver. Such is the case in the suburbs of the Syrian capital of Damascus. "The network is severely damaged in every corner of the city, so you have leakages everywhere," he says. "But having no alternative sources, they over-pump knowing that they're going to lose 60 to 70 per cent of this water. The problem is much of that water is coming from sources where there is not believed to be a deep reserve. "No one can tell how long it will last," says Kaelin.

A QUESTION OF TIME AND CONTAMINATION

One of the greatest concerns is that untreated waste-water might seep into local aquifers, thereby contaminating water supplies and leaving an already vulnerable population more susceptible to water-borne diseases.

"The two main waste-water treatment plants in the country, for Aleppo and Damascus, are completely damaged," Kaelin notes, adding that both treatment plants are now being completely bypassed. "Sewage goes untreated and is discharged into the local environment, and which then poses a risk of contamination to the groundwater, and hence potential water supplies."

"Through its programmes, the ICRC supports the disinfection of close to 80 per cent of all water that is produced in Syria. If that system collapses, there is the risk of epidemics of water-borne diseases. Then we would be looking at a whole new stage of the crisis."

Talhami shares his concern. "In conflict settings, sanitation is all too often relegated to a lower priority," says Talhami. "It is also most often true that it is a 'ticking time bomb' in terms of its impact on the general environment, water resources (surface and groundwater) and, by extension, to human health."

What we are doing about it / Syria 2014

> **15 million**: The number people who have benefited in 2014 from improved water supplies and sanitation due to large-scale ICRC emergency support in cooperation with local water boards. This work has been facilitated by various parties including the Ministry of Water Resources as well as the Syrian Arab Red Crescent.

6.3 million: The approximate number of people able to once again have access to clean water following repairs to damaged infrastructure.

370,000: Number of people who have been displaced within Syria that have received water via deliveries by truck.

160,000: Number of displaced people who have benefited from upgraded and rehabilitated hosting centers, as well as water and sanitation facilities.

170,000: Number of displaced people who have been provided with bottled water.

The ICRC also helped bring even more potable water to people living in cities and towns where water supply systems were functioning, but which needed repairs, spare parts, water-treatment chemicals or other supplies needed to operate water treatment plants.

All these efforts were possible by working in cooperation with Syrian Arab Red Crescent staff and volunteers.

JORDAN: HUGE DEMANDS PLACED ON AN AGING SYSTEM

Effects of conflict: Water in Jordan

- *10 percent increase in population over 4 years.*
- *Severely strained water systems (doubling of service use in some areas)*
- *Reduced levels of water availability and water quality.*
- *Increase of purchase prices from private markets, such as water sold from tanker trucks.*
- *Mounting social grievances among Syrian refugees and host communities over access to water and competition over access to electricity, food, schooling, housing and health care.*

Prior to the conflict in Syria and the influx of refugees into Jordan, water use in the country was already unsustainable.

In many parts of the country, the local authorities were dealing with declining water table levels, increasing pumping costs and an increase in the salinity of groundwater. Consumption of water by agriculture prior to the conflict made up roughly 65 percent of water use.

At the same time, in many parts of Jordan the water infrastructure was ageing and not able to efficiently handle the demand. The north of Jordan in particular had the highest rate of unaccounted for water, some of the lowest water consumption rates as well as issues of water quality and consistency in supply.

In this context, Jordan has absorbed an unprecedented number of refugees fleeing from the most recent conflict in Syria, which comes on top of refugee waves from previous conflicts in Iraq and Palestine. Some 80 percent of Syrian Refugees reside in host communities, while 20 percent live in camps.

In particular, the two largest camps – Za`Atari and Azraq – are both located in heavily water stressed areas in Jordan. When combined with those Syrian refugees that have found refuge among the host communities, the challenge of ensuring an adequate provision of water supply for Jordanians and Syrian refugees alike has risen drastically. This is especially true in the north of Jordan (e.g. Mafraq and Irbid) where aging municipal water supply infrastructure (up to 30 years old in some cases) had already placed these governorates well below the national average prior to the onset of the conflict in terms of unaccounted for water (up to 60 percent in some cases) as well as low water consumption rates.

Over four years into the Syrian crisis, these water-related indicators, in select communities in both Mafraq and Irbid, have been exacerbated further by an average 25 per cent increase in the local population due to the Syrian refugee crisis. As a result, water consumption has continued to decline and competition over scarce water resources has become increasingly prevalent. Other governorates have experienced a similar situation to varying degrees, most notably Jerash, Ajloun and Balqa.

"Much of the region depends on aging infrastructure that requires considerable maintenance,» says Michael Talhami «In Jordan, one of the most water-scarce countries in the world, the demand for water both from residents and from the refugees who have arrived over the years has been growing significantly."

This is why in places such as North Badia, the ICRC is endeavouring to ensure adequate access to water in coordination with the local authorities. At the same time, ICRC is providing critical support in coordination with the authorities for Syrian refugees arriving at select sites where people cross the northeastern border with Syria. At these sites, water, sanitation, shelter and other basic necessities have been made available for Syrian refugees.

The significant stress placed on the delivery of essential services, as well as accommodation, and scarce job opportunities has resulted in mounting social grievances. In Bustanah, a village in North Badia, local residents have lodged numerous complaints with the local service provider and even threatened to block the main highway connecting Jordan with Iraq if their water situation did not improve. For this reason, the ICRC endeavors to improve water and sanitation services within communities that are hosting large numbers of refugees.

What we are doing about it / Jordan 2014

16,000: The number of people living in shelter caravans on Jordan's eastern border that benefited from regular maintenance and cleaning of toilets and showers by ICRC and/or local contractors in 2014. ICRC maintenance increased the capacity of water, sanitation and septic systems.

150,000: Approximate number of people – both Syrian refugees and Jordanians from the host community – who benefited from the rehabilitation of critical water infrastructure in 8 locations of the North Badia region of Mafraq Governorate.

200,000: Number of litres of water that can be stored in **4** concrete tanks erected as part of ICRC water projects in North Badia and Mafraq. The projects also included **4** pumping stations, transmission and distribution pipelines in three villages, **2** water treatment plants and 5 wells (replaced or refurbished

‘FINDING’ NEW WATER THROUGH CONSERVATION

When looking to make more water available in arid areas, often the answer is not to sink another borehole. “Often, the knee-jerk reaction is to drill,” notes Talhami. “Local authorities often ask for that, but in the Middle East, where we’ve had a really long presence, we have a responsibility to understand the water-related situation prior to the conflict (baseline) just as much as during the conflict.”

“We can’t just work on the supply side options — ie drilling more boreholes to extract more water — that will make the water crisis even worse,” Talhami says. “We need to shift, whenever possible, to managing demand and helping to conserve water, by reducing the losses and improving the efficiency of the whole water supply system, from the source to the consumer.”

“In North Badia in the north of Jordan, this is exactly what we are striving to do,” says Talhami. By rehabilitating ageing infrastructure we can significantly reduce the losses in the system and hence make room for considerable gains in water delivery.

“We have focused on the critical infrastructure to start with, for instance by rehabilitating existing boreholes,” says Talhami. “In addition, we may either rehabilitate or construct new water treatment plants, pumping stations, water reservoirs and tanks, or main transmission lines that take the water from the source to the actual village, prior to being introduced into the village’s internal water distribution network.

“Our focus has been on reinforcing critical infrastructure that serve a group of towns that are experiencing the most strain on their water supply systems due to the sharp increase in population,” he says.

In the next phase, in 2015, the teams will begin looking at internal distribution systems within these towns and trying to mobilize potentially interested donors to engage. In this way, Talhami says there is a real potential to make a dramatic improvement in water delivery in the area.

“The shortfall in cost recovery is significant. Hence service providers often can’t maintain the infrastructure, and here is where the vicious cycle continues between service decline and collection rates. Service decline is all too often the result of a cumulative impact from neglecting to perform proper operations and maintenance. In the end the population receives a poorer service both in terms of quantity and quality, and hence is either not able or is unwilling to pay.”

A QUESTION OF QUALITY

The issues affecting water in the region do not just impact quantity but also quality. "There is a huge trend in the degradation of water sources and thereby of water quality," says Thomas Batardy, ICRC's water and habitat programme coordinator for Lebanon. "The lack of sewage networks, plus uncontrolled discharge of wastewater from industries and the lack of protection for water sources all translates into major degradation of water sources."

Talhami agrees: "The more water resources in the region are overused beyond the point of their annual replenishment from rain, you see a deterioration in the quality of the resources, which also then has repercussions on how you can use that water, as well as the financial and technical means that are needed to treat the water for specific uses."

DABBAKEH, Saleh/ICRC

LEBANON: REDUCING THE PRESSURES AND LOSSES OF CONFLICT

The effects of conflict: Water in Lebanon

- *Due to the conflict in neighboring Syria, there has been a 25 percent increase in population over 4 years.*
- *This dramatic growth in population has severely strained already overused and aging local water systems.*
- *The result is reduced levels of water availability and water quality, as well as increases in the price of water purchased from private sources such as tanker trucks.*

In Bekaa and North Lebanon, the percentage of homes connected to the local water network was well below the national average when the Syrian conflict erupted. They also suffered from some of the the highest rates of 'unaccounted for' water in the country, meaning a large percentage of the water pumped from the ground was lost before it even reached the tap. Meanwhile, problems of continuity of supply and water quality issues continue to plague the system.

On top of this, a particularly dry winter in 2013-2014, in which there was relatively little snow in the mountains, led to sustained drought conditions. Local aquifers were not able to recharge at the same rate as they usually do. To meet agricultural demand, and with domestic use far above normal, groundwater has been over utilized, which in combination with the low annual rainfall has led to a reduction in the water coming from springs.

Against this backdrop, both Bekaa and North Lebanon have absorbed a large number of refugees from Syria, increasing demand on local water supplies. As water production decreases, however, the public water supply becomes more intermittent. In some areas, water is supplied every other day. In others, water supplies might come only every seven days, depending on the local situation. This pushes citizens to purchase water from private operators, creating extra costs for both Lebanese and Syrian refugees. Increased demand has driven up water prices, (especially affecting refugees not connected to the city supply), while quality cannot be assured as private sector water trucks are under no public supervision.

Intermittent electrical power supply, along with the absence of water metering and the largely unchallenged illegal exploitation of water resources have brought the water sector to a situation from which it lacks the resources to address the current drought.

And there are other costs as well. “Where there is less of a reliable supply of electricity from the power grid, this translates into more private generators,” notes Batardy. “That doubles the cost of water for people who must pay their power grid bill plus their secondary supply through the use of generators, which require fuel to run.”

For the water providers there are many financial challengesl. “There is the whole issue of cost recovery,” says Batardy. “The service is not constant so people don’t pay their bills. As people don’t pay their bills, the service gets worse and people pay even less. The question is: how to get out of that cycle?”

The growing number of refugees has imposed an additional stress. How can local authorities manage cost recovery for a refugee population that already has difficulty paying rent? Installing water meters in camps is controversial because that gives the impression that the camps are not temporary.

In response, the ICRC has partnered with local water providers and municipalities in numerous projects to mitigate the water crisis in areas that have been most effected by the Syrian refugee influx. These include digging new boreholes, establishing or repairing wells and pumping stations to augment the existing supply by bringing more water online and by improving the efficiency of existing water sources. In other cases, the ICRC has provided generators and fuel, or worked on power-supply infrastructure, in order to help local communities meet their energy needs for the supply of water from existing wells. A key part of the ICRC’s strategy is to improve water and sanitation services within communities that are hosting large numbers of refugees.

What we are doing about it / Lebanon 2014

Boosting resilience and easing tensions: The ICRC continued working with the regional and local authorities to improve availability of water for both refugees and host communities, to reduce the pressure on residents — and the potential for tensions — which helped communities boost their resilience against the effects of drought.

> **380,000**: Number of people who benefitted from **16** projects that have increased water access or improved living conditions in settlements, which house Syrian refugees, Lebanese residents and a smaller number of Palestinian refugees.

370,000: Number of people who will benefit from **20** projects currently under way or under assessment.

800: Syrian refugees living in informal settlements in the north and in Bekaa who were provided ad hoc water supply support and site improvement from the ICRC and the Lebanese Red Cross.

SPAULL, John/ICRC

IRAQ: THREE DECADES OF WAR TAKE A TOLL

Effects of conflict: Water in Iraq

- *More than three decades of war and sanctions have seriously damaged the country's water, sanitation and energy infrastructure.*
- *The displacement of over 2.5 million people within Iraq due to fighting has exacerbated the strain placed on the country's already dilapidated water systems.*
- *Most of Iraq's water supply comes from surface water such as rivers. Reductions in surface water from ever greater upstream use, environmental variability in terms of rainfall and the inefficient distribution of water for agricultural and domestic uses has significantly worsened the water crisis in the past decade.*
- *Continued depletion of aquifers is a serious concern as more boreholes are drilled to meet demand.*

In the 1970s, Iraq was known as having one of the most developed water and electrical grids in the region, with services at a similar level to many European countries at that time.

Since then, successive wars have led to a dramatic deterioration in Iraq's infrastructure. First was the Iran-Iraq war in the 80s, and then the first Gulf War in 1990 and 1991 followed by a decade of sanctions. In 2003 the second Gulf War occurred, followed by an internal armed conflict.

In the meantime, consecutive years of drought that hit Iraq and neighboring countries from 2007 worsened an already dire situation of the country's water reserves. The flow of water in the Euphrates River, for example, has decreased and the quality of water has continued to deteriorate over the past decade. Developments upstream in Turkey, Syria and Iran have led to reduced flows and lower water quality in both the Tigris and Euphrates rivers when they reach Iraq.

This has significant implications for the economy, as some 15 percent of the workforce makes their living from the agricultural sector. Faced with reduced water flows on its two main rivers, the government has drilled new wells, extracting greater amounts of groundwater at a time when reduced rainfall and river flows have not been replenishing Iraq's aquifers at nearly the same rate.

In the meantime, Iraqi society continues to consume water and electricity at a high rate, despite the damage inflicted to its infrastructure. "Damage to the

electric and water networks coupled with consistently high demand results in a serious deficiency in supply," says Ishfaq Khan, the ICRC's Deputy Head of Delegation, who oversees all assistance programmes in Iraq. "The reduction of electric power generation has a negative implication on water treatment and pumping, which decreases access to clean water."

This has meant that in many areas water pumping and wastewater treatment are interrupted, leaving inadequate supplies of safe drinking water. At the same time, the government faces shortages of electricity, fuel, chemicals and spare parts that could reduce capacity still further.

"The quality of the water provided is decreasing day by day," says Khan. "Water treatment plants are adapting to alternative methods, such as using chlorine powder, but some only filter the water without any proper treatment."

Against this backdrop the displacement of over 2.5 million people in Iraq has exacerbated the pressure on local sources of water and water treatment plants. Now, with armed conflict spreading within Iraq, there are additional challenges in maintaining access to key water sources, electrical substations, as well as pumping stations and waste-treatment facilities.

What we are doing about it / Iraq 2014

> 2 million: Number of people who received drinkable water following the rehabilitation and construction of 89 water supply facilities and 5 irrigation canals. These irrigation canals benefitted over 30,000 people in Babil, Diyala, Kirkuk and Sulaymaniah provinces.

127: Number of technicians trained by the ICRC to operate and manage these facilities independently.

68: Number of emergency repairs that were carried out by the ICRC, at times remotely through the local contractors, in coordination with water authorities.

> 4,000: Number of detainees who benefited from the ICRC-led rehabilitation of the water supply system in 5 prisons in Babil, Baghdad, Basrah and Ninawa.

ISRAEL AND THE OCCUPIED PALESTINIAN TERRITORY

Effects of conflict: Israel and Occupied Palestinian Territory

- *Extensive damage to water, sanitation and energy infrastructure in Gaza.*
- *Risk of further contamination of groundwater due to damage to sanitation infrastructure, including water treatment plants, pipe networks and pumping stations.*
- *Long-term rehabilitation and development of water, sanitation and energy infrastructure will be required to meet basic needs of Gaza's population.*
- *14 technicians from the water and energy sector were killed during the conflict in 2014, at least 8 while undertaking emergency repairs in conflict areas.*

HOW ICRC'S NEUTRALITY AND TECHNICAL SUPPORT HELPED LOCAL WATER BOARDS AS THEY WORKED TO KEEP THE WATER FLOWING DURING CONFLICT

In the midst of conflict, ICRC water and habitat engineers often spend as much time on the phone negotiating safe access for engineers and technicians from local service providers and contractors as they do overseeing the critical repairs to damaged water or electrical systems.

"Our main role during the recent conflict in 2014 was trying to ensure technicians could safely go to inspect damage and repair it, restoring services for the population," says the ICRC's Guillaume Pierrehumbert.

"It was a bit like negotiating mini-cease fires for very specific cases or places in the midst of the fighting," he says. "It was mostly coordinating through phone calls. I would say: 'The teams absolutely need to go there, and we need to make sure that they won't be hit while they are doing the repairs.'"

This kind of dual role of engineer and negotiator — usually undertaken in coordination with delegates in ICRC's protection division — speaks of the unique work that ICRC can accomplish due to its neutral, impartial and independent standing. Maintaining trust on all sides is critical as often, when repairs of this kind are at stake, time is of the essence. (*To learn more, see the sidebar article: Hardhat Diplomacy below*).

"If a waste water line is hit we'll want to repair it quickly so that the overflow of sewage into the general environment does not pose a risk to the people in the immediate vicinity," says ICRC's Michael Talhami. "It's also a risk to

groundwater. The fact that Gaza does not have adequate wastewater treatment facilities means that a lot of wastewater goes untreated and either seeps into the groundwater or is discharged to the sea. In the latter case this poses a risk to both the Gazan population and to Israel, since the current in the Mediterranean flows to the north."

At the same time, it would not be possible for ICRC to do this work on its own. This is why ICRC works closely with the Coastal Municipalities Water Utility (CMWU), municipal water departments, the utility company (GEDCo) and the Energy Authority — all of which are accustomed to solving complex technical problems across political and conflict lines. In Gaza, the ICRC is the main organization carrying out the coordination during times of hostilities with the parties to the conflict, for water and sanitation especially and to a lesser degree energy as well, to attempt to ensure safe access to conduct assessments and carry out repairs.

"During times of hostilities, we work closely with our local partners to identify and assess the emergency needs that we know of, in terms of water, sanitation, and energy, and then we prioritize the necessary interventions, and then we coordinate with the parties to the conflict in order to be able to gain safe access," Talhami says. "When access has been granted and when it is necessary for us to accompany our local partners then we go in with the technicians from the CMWU and municipal water departments, as well as with a contractor, to be able to do the repairs."

The death of 14 technicians during the conflict — eight of whom were killed while performing emergency repairs — is not only tragic for their families and friends. The entire population suffers as these workers have a high degree of technical skills and extensive knowledge of complex local power and water systems that are extremely difficult to replace.

The ICRC continues to address issues related to water with authorities in diplomatic representations in Gaza, the West Bank and Tel Aviv, with particular attention paid to Israel's responsibilities under international law as an occupying force.

REBUILDING: AN URGENT MATTER OF COMMUNITY HEALTH

Now in Gaza attention has turned to reconstruction. While this is clearly a long-term proposition, it is also a matter of urgency. In some areas the damage caused to water supply systems by successive rounds of fighting has seriously reduced the storage capacity of water (i.e. reservoirs and water tanks) and caused significant wastewater leakage, which threatens the very source of water that Gazans use for domestic and agricultural uses.

In Beit Hanoun, a town of 50,000 people in northern Gaza, damage to sewage and water supply infrastructure poses a serious health risk to residents. In the meantime, cuts in electrical and water supplies have gotten much worse.

"In the past, we had water for two hours each day," says Mohamed Jarad, a Beit Hanoun resident, adding that due to electricity cuts of up to six hours, there is access to water but no electricity to pump it. "The kids cannot drink or shower. As for the sewage system, the pipelines broke during the war. The sewage flooded, bringing mosquitos. Our kids cannot sleep at night."

Standing next to a pool of stagnant water and sewage that has seeped from a broken sewage pipe, ICRC water and habitat engineer Sara Badiei says the current conditions are "a breeding ground for disease."

"In a populated area, this creates a serious threat to people's health," she says. "When you consider this is happening in an area where there are broken water pipes, that means there is mixing going on between sewage systems and regular water supply for the population."

To restore these services and mitigate any further environmental harm the ICRC is working with local authorities, service providers and contractors to rehabilitate three damaged pumping stations in Beit Hanoun as well as parts of the network of sewage and water pipes in the town. "What you can see when you look around Beit Hanoun is that the damage is extensive," Badiei says, standing on a field of bulldozed dirt and concrete where roads and houses once stood. "The damage is far beyond what any one entity can fix but there are so many places in addition to Beit Hanoun that need help and support."

What we are doing about it

1.28 million: Number of people in Gaza who received water and sanitation services through the ICRC's support to emergency repairs, rehabilitation and maintenance of essential infrastructure during the seven-week long conflict in 2014.

6 million: Number of liters of water delivered by water truck in 2014 to **73,000 people** displaced by fighting.

400,000: Number of people in the southern part of Gaza strip who received water from upgraded water networks following the completion of a project initiated in early 2014.

300,000: Number of people who benefitted from emergency repairs that brought water and sanitation services back to the pre-war level.

20: Number of kilometers of water networks repaired in 2014.

1,560: Number of detainees who benefited from improved conditions of detention (water supply, power supply, food storage) through the completion of **8** projects in the central prisons of the Gaza Strip.

LOCAL WATER BOARDS: PARTNERS IN PROVIDING SERVICE

Gaza is not the only place where relationships with local providers play a critical role in restoring access to essential services (water, sanitation and energy) during conflict. The staff who make up these water boards not only know their own systems intimately, they have a depth of technical knowledge, skill and experience that are a critical complement to the talents of ICRC engineering staff.

"We work extremely closely with these local service providers, not only on a daily but sometimes hourly basis, to help prioritize which interventions, projects or emergency responses need to happen first," says Talhami.

Ideally, these relationships begin before the fighting starts, as was the case for Gaza. "Often these relationships have been developed over many, many years," says Talhami. "They are strong because we've shown the commitment and wherewithal to be there during the most difficult times, working alongside them. Then afterwards we help to rehabilitate damaged infrastructure and also to refine and improve the joint emergency response that is developed based on a thorough review of the lessons learnt in case another round of hostilities was to erupt."

The service providers are also critical to helping ICRC assess the affected areas and understand the needs. In areas where the ICRC is not able to gain access itself, local water board technicians and contractors can carry out critical repairs on their own with financial or logistical support from the ICRC.

"To be able to do the assessment, diagnose what the problems are and provide an adequate response, you must have safe access to the affected population and the infrastructure that serves them," says Talhami. "With the difficulties in gaining safe access in many of the conflicts in the region, it's not enough to say that we don't have access so therefore we can't do anything."

"That's when we rely on our relationships with the service providers — the central, legitimate water and supply operators — while we also find mechanisms for remote management where necessary," says Talhami. That approach works best in areas where the ICRC has been able to build up relationships with local service providers over time. It's more difficult in places where that working relationship has not yet been forged.

When conflict erupted in Syria in 2011, for example, the ICRC didn't have those kind of links with local service providers. "By 2012, when we really had to upscale to provide assistance to most of the governorates in Syria, this

is when these relationships started to really develop," says ICRC water and habitat coordinator in Syria, David Kaelin. "It took time to develop with each of the water boards and each of the governorates within Syria."

"But now we have quite a well-developed relationship. We have regular communication with them, we know the type of spare parts that they need, how much they need, and we can ensure that they receive them so that they continue to not only have the electricity necessary to run the water and waste water infrastructure, but especially to be able to do the water treatment."

"The ICRC also aims to stabilize urban water services in particular in coordination with the authorities and local service providers," Talhami says. "But in conflicts that become protracted at some point you have to move beyond the reactive emergency response to be more proactive whenever possible in terms of preventative maintenance."

HARDHAT DIPLOMACY: ENSURING SAFE PASSAGE

For the men and women in ICRC's water and habitat unit, often the hardest and most time-consuming part of the job is not coordinating the repairs to damaged infrastructure. Rather it's the negotiations with all parties to the conflict to guarantee safe passage for engineers, technicians and contractors to assess the damage and then make the necessary repairs.

"I spend most of my time on diplomacy and negotiation," says David Kaelin, ICRC water and habitat coordinator in Syria.

One case-in-point came after a main water transmission pipeline, which supplies water to Hama, a city of almost 1.3 million people, was damaged in the fighting. The ICRC needed to go in with the water board to do an assessment, but it needed a guarantee of safety.

"It took almost 3 weeks to do the actual negotiation to get access," recalls Talhami. "Whereas it took less than 1 week to actually do the repairs. This is why we often say that to do an emergency response it's less about the technical side and the ability of the contractors to perform the work, and more about the politics and negotiations that are necessary to ensure that you have safe access."

For Kaelin, the best example of ICRC's ability to negotiate access based on principles of neutrality, impartiality and independence is in the Syrian city of Aleppo. "Our engineers are able to cross front lines," he says. On the one hand they work very closely with the water boards, which depend on the government. On the other hand they are also able to work with the service department of one of the opposition groups."

"The water board teams are allowed to come with us. We provide this service as a neutral intermediary and through our negotiation access for the engineers in charge is guaranteed and tolerated. Same with the Syrian Arab Red Crescent, coming with us, on site, and allowed to perform maintenance and repairs."

"Then there are some places where we work with proxies," said Kaelin. "In areas controlled by opposition groups, we rely a lot on the volunteers of the Syrian Arab Red Crescent."

"We have now about 150 volunteers who have been trained by us, and they have about 30-40 engineers. In cases where we still do not have a direct contact with armed opposition groups, they are the intermediaries. Because we have this neutral position, we can bring in material. Same for the government side, which also allows us to go into this area and cross lines."

YEMEN: THE INTERSECTION OF CONFLICT AND WATER

The Effects of Conflict: Yemen

- *The government says more people have died in recent years due to clashes over water than in the civil unrest of 2011 and 2012.*
- *There is significant over-exploitation of groundwater resources, especially in the highlands.*
- *The cultivation of water-hungry Qat, a plant chewed for its stimulant effects, now takes up a disproportionate amount of Yemen's irrigated land. Each year, the area irrigated for qat cultivation grows by roughly 9 per cent. Qat cultivation could deplete groundwater resources in the end and consequently wipe out the rural economy.*
- *Problems with the provision of basic services, such as water and energy, fuel widespread discontent and civil unrest. Unless the political and economic crisis is reversed, ecological destruction and water scarcity will continue to fuel local disputes over water resources and supplies.*

Of all the countries in the Middle East and Gulf region, Yemen may serve as the best study of what happens when water overuse in an extremely arid area is not tackled in a coordinated and sustainable manner. Today in Yemen, water scarcity is seen as one of the nation's most pressing economic, health and national security issues.

MARTIN-CHICO, Catalina/ICRC

"In Yemen, it's foreseen that by 2025 Sana'a the capital will have no more water," says Caroline Pellaton, ICRC's water and habitat programme coordinator for Yemen. "The water table is dropping every year. So it's becoming more and more difficult, and you'll see more people migrating to urban areas. Boreholes have to be dug deeper and deeper, but there's a limit to where you can go. So this is anticipated to be the most crucial problem that Yemen must face in the near future."

In 2009 the country's minister of water and environment said that if water use continues unabated, the government will have to move Sana'a, the capital, to the coast. Otherwise there will be no way to meet the water supply needs of the population.

The water shortage ramifications includerisks to public health, nutrition, economic development and social stability for a vast majority of the country. "The government often raises the point that although the civil unrest of 2011 and 2012 resulted in a significant number of people who died or were injured, during that same period of time, there were more deaths related to local social conflicts over water and land," says ICRC's Michael Talhami. "This is due to the severity of the competition between agricultural and domestic uses of water and in some cases urban and rural uses."

In Abyan, on the Abyan Delta, an intricate network of *wadis* (dry riverbeds with intermittent water flows) going from the mountains to the sea, a dispute over water resources is taking place. Farmers living on the upstream section of the *wadi* used dams to provide water for the irrigation of crops, usually for sale for cash (ie. banana cultivation). They use most of the water, leaving those downstream with insufficient supplies to sustain their agricultural production. This has triggered tensions among the villages and farmers in this area.

In response the ICRC has begun to work with the Ministry of Agriculture to promote more sustainable irrigation techniques. In Saada ICRC teams are working on the Ministry of Agriculture's nursery farm investigating if water-saving "spate" or "drip" irrigation can be introduced. If water can be better conserved it is hoped there may sufficient supply to cover the basic needs of most growers and tensions could be diminished.

Similarly, the ICRC has started to implement rainwater harvesting projects, primarily for agricultural use. This is another attempt at augmenting the supply of water for farmers without further exacerbating the deteriorating groundwater situation. "Obviously, the scale at which the ICRC is operating will not end the water crisis in Yemen, but it could act as an example of good practice, which could then be replicated and expanded with funding from international donors in coordination with the authorities," Talhami says.

"In Yemen, there is a clear relationship between water and social tension," says Andrea Pascarelli, who served as Water and Habitat programme coordinator in Yemen for several years before moving to Kabul. "Yemen doesn't have trans-boundary water issues as most of the other countries in the region do, rather they are internal matters." These issues include disputes over water use between tribes, or between urban and rural communities, and between domestic and agricultural uses.

Those tensions are often not just about water. Often there are connections to local politics, tribal affiliation, economic hardship, the lack of livelihoods, and general community health. "The opportunity for ICRC therefore is to be multi-disciplinary, to have both a protection and an assistance approach to these situation of violence," says Pascarelli.

The solutions go well beyond engineering a more efficient water system. Often the ICRC takes a multi-disciplinary approach, bringing together people with expertise in water, agriculture, economic security, health and protection. "The Water and Habitat people don't work in isolation," says Pellaton. "It's often an integrated approach with economic security people, as well as people from health, communications and protection. So it's the whole added value."

The teams often represent a mix of staff from aboard as well as Yemeni staff who have considerable experience as engineers but who also understand the local language, customs and political environment.

"The problem in many areas, especially in rural areas is that there is a tribal layer, which is part of the equation," notes Pascarelli. "It's a big challenge, because disputes over water assets are quite common in rural areas, and they do not follow the ethnic or the political line, but the tribal line."

This is yet another reason why the ICRC relies heavily on its Yemeni staff members for their intimate knowledge of the local context. Yemen's current Water and Habitat coordinator Pellaton says these staff members are critical in assessing and analyzing local situations. They also play a key role in helping to establish the trust of local communities.

"If you work in the rural environment, you really have to gain the trust of the people you are working with," says Pellaton. "We work with a memorandum of understanding with the local service providers for the benefit of the communities, but it's a never ending discussion. If anything goes wrong during the implementation of these projects, basically it means ICRC could lose access to these sites and to the community in the future. So it's always a delicate balance."

Humanitarians seeking to mitigate the impacts of water scarcity also need to have an understanding of agricultural production and local markets. As water in Yemen has become scarcer, and the country produces cash crops at the expensive of the staples required for nutrition, the country has become less food secure.

"Because of water scarcity, but also due to heavily favoring cash crops, many foodstuffs have to be imported from abroad," notes Talhami. "But the cost of these food commodities in the local market can be too expensive for the most marginalized members of society."

What we are doing about it / Yemen 2014

> 1 million: Approximate number of people in 2014 who benefited from the improvement of water storage and distribution facilities in urban areas (Saada, Taiz, and Aden cities) due to work carried out in partnership with local water boards.

46,500: Approximate number of people living in rural areas of Yemen who received water through various initiatives in partnership with local water boards.

450: Number of people in Amran displaced due to the conflict in the northern, center and southern parts of the country, who received water via trucks in 2014.

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