



URBAN SERVICES DURING PROTRACTED ARMED CONFLICT

**A CALL FOR A BETTER APPROACH
TO ASSISTING AFFECTED PEOPLE**



ICRC

To be cited as: ICRC 2015, Urban services during protracted armed conflict: a call for a better approach to assisting affected people, International Committee of the Red Cross, Geneva.

Cover photo: Palestinian children look out of a window of their family home. (Gaza) © M. Fathi/NURPHOTO



International Committee of the Red Cross
19, avenue de la Paix
1202 Geneva, Switzerland
T + 41 22 734 60 01 F + 41 22 733 20 57
E-mail: shop@icrc.org www.icrc.org
© ICRC, September 2015

URBAN SERVICES DURING PROTRACTED ARMED CONFLICT

**A CALL FOR A BETTER APPROACH
TO ASSISTING AFFECTED PEOPLE**

TABLE OF CONTENTS

Authors	4
Foreword.....	5
Acknowledgments	6
EXECUTIVE SUMMARY	7
Why has this report been written?	7
What are the main messages of this report?	8
What action should be taken following this report?	11
1. ESSENTIAL SERVICES AND PROTRACTED ARMED CONFLICT IN URBAN CONTEXTS	13
1.1. Objectives of this report	13
Methodology	14
1.2. The complex urban context.....	14
Underlying vulnerabilities of urban areas.....	14
Opportunities in urban areas.....	16
1.3. Understanding essential urban services.....	17
Proposed definition of “urban context”	17
Essential services: people, hardware and consumables	18
2. IMPACT OF PROTRACTED ARMED CONFLICT ON ESSENTIAL URBAN SERVICES	21
2.1. Direct, indirect and cumulative impact.....	21
Direct, indirect and cumulative impacts.....	21
Impact on critical people	22
Impact on critical hardware	24
Impact on critical consumables.....	27
2.2. Factors affecting impact.....	28
Interconnectivity of essential services	28
Dependence on services outside urban areas	29
The cumulative impact of sanctions, embargoes and other restrictions	29
Indirect impact of large population movements	30
Impact on public health, and reliability of services.....	31
3. ISSUES WITH AN IMPACT ON EFFECTIVE ASSISTANCE	33
3.1. Long-term impact on services and people.....	33
3.2. Is relief-rehabilitation-development even relevant?	34
3.3. Funding that does not match the needs	35
3.4. Working with others	36
Working with authorities and local actors	36
Working with beneficiaries	38
Working with the private sector	38
3.5. IHL and essential services: some challenges.....	39
4. THE CALL FOR A BETTER APPROACH TO ASSISTING AFFECTED PEOPLE.....	41
4.1. The core issues	41
4.2. The path to a better approach	42
4.3. Continuing the discussion.....	43
ANNEX A – SUMMARY OF THE IRAQ STUDY	45
ANNEX B – SUMMARY OF GAZA STUDY	49
ANNEX C – METHODOLOGY AND LIMITATIONS OF THE REPORT	51
ANNEX D – PROTECTION OF ESSENTIAL SERVICES UNDER IHL AND OTHER BODIES OF LAW	53
REFERENCES	63

Authors

The writing of this report and the project on which it is based were supervised by Jean-Philippe Dross, Head of the Water and Habitat Unit at the ICRC, who coordinated contributions from Dr Mark Zeitoun (University of East Anglia) as well as from Javier Cordoba, Evaristo de Pinho Oliveira and Michael Talhami of the ICRC's Water and Habitat Unit.

Foreword

We are increasingly witnessing the catastrophic impact of armed conflict in urban areas with some 50 million people today bearing the brunt of the consequences. Civilians are killed and injured, communities are torn apart and displaced, and basic services that are essential for survival are disrupted. When armed conflicts in urban areas last years or even decades, the humanitarian needs become even more acute as entire systems and public services are weakened or cease to function.

The resilience of a person, family or community is stretched to the limit when the means of covering basic human needs lies beyond their control. This is particularly the case for those living in urban environments rather than rural areas, given their dependence on increasingly complex essential services. Humanitarian approaches and responses must therefore be designed very differently from at present.

In many of these contexts today, the water supply system has failed, electricity has been cut off and municipalities are no longer able to treat wastewater or collect solid waste, while collapsing infrastructure means that hospitals and health services no longer have the ability to care for the wounded or treat chronic diseases. This is compounded by the fact that educational and employment opportunities are lost. As a result, large numbers of people are internally displaced or seek refuge in neighbouring countries, overburdening the capacities of the host city's infrastructure. In today's world, it is the civilians trapped between the parties to the conflict in urban areas, more than the belligerents themselves, who are suffering most of the casualties and ongoing effects of public service and economic decline.

For over 30 years the ICRC has been "learning by doing" in urban areas where armed conflict has become protracted and, as a result, has developed more effective approaches that meet the evolving needs on the ground. For example, the ICRC has maintained a long-term presence in Iraq since the onset of the first Gulf War in 1991, when it began by keeping the city's power grid, water supply and water treatment plants in operation and then adapted its response over time to the changing environment. In Syria today, the ICRC provides support for the running and maintenance of essential infrastructure across most of the country, including supplying water treatment products no longer available locally to ensure access to safe drinking water.

Based on the ICRC's experience, this report analyses the humanitarian response in urban areas and the progressive deterioration of essential services during protracted armed conflicts. Above all, attention is drawn to the dramatic cumulative impact and the increasing risk posed to public health. To a considerable extent, the problems stem from the complexity of urban systems and their dependence on large-scale, interconnected infrastructures that rely on the availability of qualified staff to ensure service delivery. It also calls for action to address the challenges that arise in some contexts from the lack of respect for international humanitarian law (IHL) in urban warfare and from the effects of hostilities on complex and interconnected urban infrastructures.

These diverse challenges and complexities need to be taken into account by humanitarian organizations if more effective responses are to be found. This report questions the current paradigms and proposes a new, more appropriate and sustainable approach based on a long-term integrated response across all sectors, spanning both the humanitarian and development spectrums, as well as a review of funding strategies and mechanisms in order to better respond to the immense humanitarian needs.

Dominik Stillhart
Director of Operations

Acknowledgments

This ICRC publication is the result of research conducted in conjunction with the Water Security Research Centre of the University of East Anglia under the supervision of Dr Mark Zeitoun. The ICRC would like to thank him for his invaluable contribution and his team members, Heather Elaydi, Stephanie Hawkins, Charles Thompson and Ruth MacDougall, for their work on the literature review.



At the ICRC, we would like to extend our thanks to a number of colleagues who provided practical support and constructive advice. Particularly helpful input came from a number of the ICRC's water and habitat engineers, as well as from members of the Protection and Legal Divisions.

This report was inspired by the commitment of thousands of people who struggle every day to maintain essential services for those who are trapped in situations of protracted urban conflict. We trust that in some way our proposals pay tribute to them.

EXECUTIVE SUMMARY

Why has this report been written?

This report seeks to stimulate the much-needed discussion on developing a better approach to assisting people in urban areas that have been affected by protracted armed conflict. It combines current research with over three decades of ICRC experience in urban areas, deriving information through focus groups and individual interviews as well as from in-depth studies on Iraq and Gaza.

The undertaking is driven not merely by the greater frequency of protracted armed conflicts that are increasingly playing out in urban areas. Currently, some 50 million people worldwide are affected by armed conflict in urban areas, with knock-on effects that go far beyond the visible signs of destruction. Experience suggests that most of these people are more dependent on essential services than their rural compatriots, making them more vulnerable to service disruptions. On account of their size, their complexity and the intricate networks of interpersonal relationships, urban contexts also present challenges in the spheres of logistics and politics. Developing adequate responses is all the more difficult when the inherent complexity of an urban context is compounded by repeated cycles of armed conflict and/or the effect of international sanctions, embargoes and/or other restrictions on trade, importation and delivery of goods. At the same time, however, urban spaces offer opportunities for interventions which are not available in the rural contexts that historically have been the setting for most humanitarian assistance responses.

At its most general level, this report seeks to increase awareness of the extent and nature of the impact of the deprivation of urban services during times of armed conflict, sometimes for decades in succession. More specifically, it calls for a move from traditional assistance paradigms to one that takes account of the longer-term realities and needs in urban areas affected by ongoing armed conflict. It also gives the reasoning behind this call by explaining how the quality of essential urban services can deteriorate to a point of no return through a “vicious cycle” of accumulated direct and indirect impacts which pose a serious risk to people’s health and well-being and or lead to undue displacement. In suggesting a way forward, the report identifies what is required to best meet the challenge and to ensure the right response in the right place at the right time.

What are the main messages of this report?

1. The relief-rehabilitation-development paradigm is counterproductive in contexts of protracted armed conflict in urban areas. Experience of disaster relief and rural armed conflict has shown that it constricts planning by limiting interventions to those that are “relief” or “post-war” in nature and that may be seen as the first steps in bridging an artificial gap between conflict and development. In many current protracted armed conflict contexts, interventions in urban areas can fall far short of the mark when it comes to people’s needs.

2. A new paradigm is required in order to rise to the challenges posed by protracted armed conflict in urban areas. It must take account of the complexity of the challenges, whose origins lie in (a) the sheer *scale* of the challenges (infrastructure is so complex in large cities that the restoration of parts of it can immediately benefit several hundred thousand people but the option is often too costly for municipalities and humanitarian agencies that are geared to more traditional emergency responses); (b) the *duration* of the challenges (the people in Iraq have been living in a combination of international armed conflict (IAC) and non-international armed conflict (NIAC) for decades; (c) the multi-faceted *interconnectivity* of the essential services; (d) *cumulative* and *indirect impacts* as well as direct impacts; (e) the *politics* of a highly securitized operating environment (implicitly, good relationships with local authorities are not only crucial, they are constantly changing and not without risk); (f) the significant *shortcomings* resulting from gaps in evidence and analysis; (g) challenges associated with the enforcement and application of *international humanitarian law (IHL)*; and (h) *funding* that does not match the duration or scale of the needs.

3. Urban services are based on interdependent people, hardware and consumables. Disruptions to essential urban services can be caused by adverse effects on any one of the components that make up the service: critical people (especially operations and maintenance staff), critical hardware (e.g. infrastructure, equipment) and critical consumables (e.g. fuel, chlorine, medicine). No one component is sufficient on its own. It is pointless having the spare parts required to repair a power substation, for instance, if the only skilled staff able to install them have fled the conflict.

4. “Urban” extends beyond the city. Some critical elements of essential services (e.g. those provided by electrical power plants, supply routes, water and wastewater treatment plants) are more often than not located outside the city limits. Very distant active combat can thus have dramatic effect on urban dwellers. In this report, we define “urban” in the context of humanitarian responses as *the area within which civilians vulnerable to disruptions in essential services reside and the network of components supporting those services*.

5. Urban services are interconnected. For instance, a damaged electrical transformer can immediately shut down the supply of water to an entire neighbourhood or hospital, greatly reducing the quality of the public health service and drastically increasing the risks posed to public health and well-being. The set of skills required to best address such interconnectivity calls into question the silo mentality that exists all too often in municipalities and humanitarian agencies and that impedes cross-sectoral cooperation (e.g. between health, water and sanitation, energy and agriculture). Moreover, many humanitarian agencies have tended to focus historically on developing their capacity to deal with water quantity and quality issues and few, if any, have developed the necessary competences to tackle the urban infrastructural challenges associated with energy supply and wastewater treatment.

6. Services are disrupted by interconnected *direct, indirect and cumulative impact*. Armed conflict can disrupt any one of the three components (people, hardware and consumables) that make up a service either directly (e.g. a water tower pierced by a tank shell, chlorine shortages due to sanctions) or indirectly (e.g. critical municipal or humanitarian agency staff not showing up for work because access is unsafe). Over time, direct and indirect effects can have an incremental impact on a service, with the result that their effect is cumulative – and much more difficult to address.

7. If not dealt with in time, “vicious cycles” may render the restoration of a service unfeasible. The accumulation of incremental impacts can lead to progressive deterioration of any service and an associated cumulative impact on people. The effect may at some point become unavoidable and the “vicious cycles” of cumulative impact on all three components (people, hardware and consumables) during protracted armed conflicts in urban areas can lead to a condition that is too technically difficult or simply too expensive to reverse. At present, most assistance is failing to achieve the objective of avoiding such cycles. The new paradigm is therefore driven by a desire to remedy that situation.

8. International humanitarian law (IHL) offers a degree of protection. However, while IHL protects all service components from the direct impact of armed conflict, there are specific challenges arising from its interpretation and application in urban warfare, in particular the extent to which IHL provides protection against the indirect or cumulative impact of hostilities on essential services. The ICRC is actively seeking to address some of these challenges, in particular through its work on the use of explosive weapons in populated areas.

9. Insufficient research has been conducted on the impact of disruptions to urban services on people’s lives over time. One priority area is the need to gain an understanding of how disruptions to services affect people’s livelihoods, food security, human security and health. Many humanitarian agencies have programmes targeting the direct impact of these disruptions but not the indirect or cumulative impact on the broader nexus of interrelated humanitarian issues of concern.

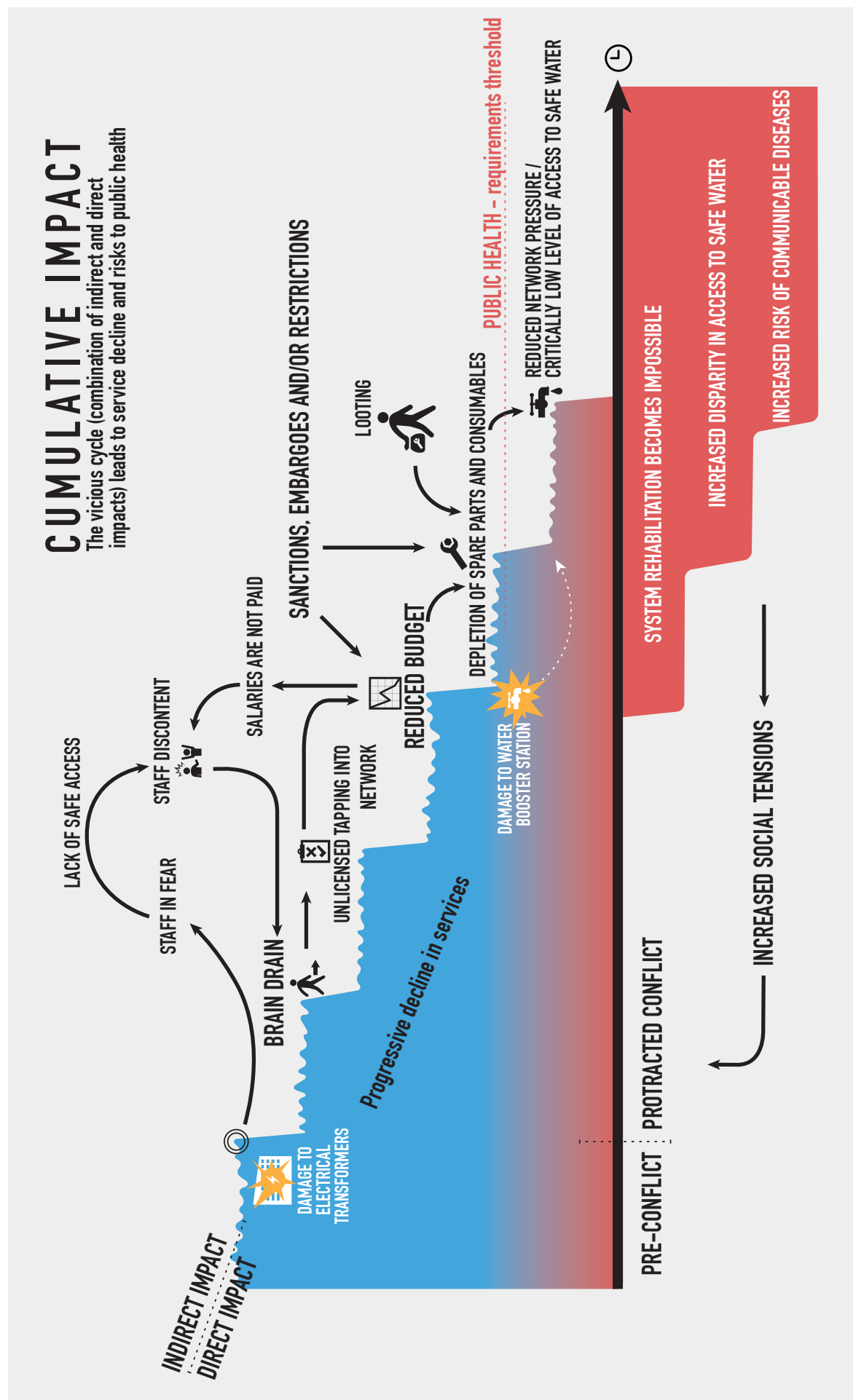


Figure. Cumulative impact: the vicious cycle (combination of indirect and direct impacts) leads to service decline and possibly contributes to the conflict originally driving the deterioration of services.

What action should be taken following this report?

This report asserts that *all involved* should work to *develop a better, more coherent approach* if assistance is to be more effective over the long term. The above-mentioned features of the new paradigm suggest that reforms to the relief-rehabilitation-development cycle need to be taken further and initiated earlier – and complement calls from many other circles. The fact that differing interpretations of some rules of IHL generate different results in terms of the protection of civilian objects draws attention to the need to *build an effective protection dialogue based on IHL with the aim of providing clarification of its provisions*. This is an important part of *encouraging greater compliance with IHL and hence of mitigating the humanitarian consequences of armed conflict*. In this regard it is also a vital step towards ensuring that States and other actors begin to take account of the interconnectivities of essential services and the cumulative impact of protracted armed conflict. This particular dialogue must also provide opportunities to interpret the growing evidence of the indirect impact of protracted armed conflict on people's lives and to discuss foreseeable reverberating effects in the light of the rules of proportionality and precautions in attack. These issues are being addressed as part of the ICRC's work on the use of explosive weapons in populated areas.

Local and international implementing agencies should then consider the implications for their own operations. It will be necessary to extend planning to cover multiple years (depending on the context) if adequate account is to be taken of the severity and complexity of the situation. Space for this extended planning might be created by first *providing the reasoning behind improved funding schemes* that are in line with the scale and duration of the challenges that they are intended to meet. This step could be supported by *establishing the evidence base* required to underpin the new paradigm, as outlined in this report. Field staff can be well suited to documenting direct and indirect impact if trained in new reporting structures, for instance. Ultimately, local and international implementing agencies will also have to *improve their logistical and technical capacity* to deal with the complexity of the challenges. Failing that, these agencies should evaluate the support that they provide for local coping mechanisms since many coping mechanisms can be counterproductive and/or dangerous to others.

Donors should consider *reviewing their funding schemes to ensure that they are appropriate for the scale and duration of the challenge*. Relief, rehabilitation and development efforts will be much more expensive and take far longer if humanitarian agencies working in coordination with local service providers are not enabled to mitigate the consequences of indirect and cumulative effects to the full extent that it is possible in urban areas during times of armed conflict. The evidence base required to support the shift in approach will have to address a number of research gaps, particularly in order to document and deepen the understanding of the impact of a deterioration in services on public health and livelihoods, as well as to enhance the interpretation of IHL and to promote broader coverage of essential urban services under IHL.

1. ESSENTIAL SERVICES AND PROTRACTED ARMED CONFLICT IN URBAN CONTEXTS

1.1. Objectives of this report

The tendency of armed conflicts to be fought in urban areas has led to considerable interest in urban contexts among humanitarian actors and researchers¹ but there is little that is new about war in cities (Davis 2003). It is humanitarian actors that are new to cities, and most organizations will have to overcome a “steep learning curve” in order to effectively handle the complexity and scale of urban challenges (Lucchi 2013, p. 1).

This report seeks to progress up that curve by stimulating the discussion needed to develop a better approach to assisting people in urban areas affected by disruptions to essential services during protracted armed conflict. It is not merely the increased frequency of protracted armed conflicts in urban areas that is driving the quest for a new paradigm (Figure 1, Section 1.3). Experience suggests that people in urban areas are more dependent on essential services than most of their rural compatriots, making them more vulnerable to service disruptions. Urban spaces are also clearly complex places for humanitarian agencies to work in, both logistically and politically, owing to the magnitude and duration of the challenges and the sensitive network of interpersonal relationships. Developing adequate responses is all the more difficult when the complexity of the urban setting is compounded by unceasing violence, a frequent lack of respect for IHL and/or the effect of international trade sanctions, embargoes or other restrictions on the entry and delivery of materials. At the same time, urban spaces offer plenty of opportunities for assistance interventions that are not available in the rural contexts that have historically been the focus of most assistance responses.

Decades of work in urban contexts suggest that humanitarian actors are generally failing to develop, much less implement, adequate assistance programmes or to seize existing opportunities. Few have chosen to rise to or even to conceptualize the challenge.

¹ Including, for example, the special issue of the *International Review of the Red Cross* (Vol. 92, No. 878, June 2010), a number of research programmes (Groupe URD's *Villes en guerre*, the Centre for Urban Conflicts Research's *Conflict in Cities*, the Harvard Humanitarian Initiative's *Urbanization and Emergencies*, the University of Manchester's *Understanding the Tipping Point of Urban Conflict*), recent reviews and gap analysis (Sanderson *et al.* 2012, Taylor *et al.* 2012, Bastable and Russell 2013) and conceptual work (Bastable and Lamb 2011, International Federation 2012a, Brown *et al.* 2013, RedR 2013).

The first step towards improving assistance is to learn from and share experience. The experience and analysis discussed in this report stress the need to move from assistance paradigms founded on rural or disaster-relief experience to a paradigm that takes account of the realities of urban conflict. It is worth mentioning that within protracted armed conflicts this reality needs to be viewed not only in terms of the local population, but also in terms of internally displaced persons (IDPs) and in some cases even extends across borders in the case of refugees who have spent prolonged periods of time in urban host communities (e.g. Syrian refugees in Lebanon and Jordan). The report also gives the reasoning behind the call for a new approach by explaining how the quality of essential urban services can deteriorate to a point of no return through a “vicious cycle” of accumulated effects which pose a serious risk to people’s health and well-being and or lead to undue displacement. In suggesting a way forward, the report identifies what is required to best address the challenge and to ensure the right response in the right place at the right time.

Methodology

This report is an abridged version of a more comprehensive internal ICRC report and synthesizes several sources of information: (a) an internal literature review completed in November 2013; (b) ICRC operational field experience and knowledge; and (c) detailed long-term studies of the cases of Iraq and Gaza, based on internal ICRC records (summaries of which are provided in Annexes A and B). Further information on the report’s methodology and limitations is provided in Annex C.

1.2. The complex urban context

Urban areas are, above all else, complex. Modern cities and supply routes are characterized by a number of features which result in their residents being particularly exposed and vulnerable to armed conflicts. This section explores such features, proposes a tailored definition of “urban context” and defines the critical components of essential urban services.

Underlying vulnerabilities of urban areas

Residents’ high dependence on basic services. The main vulnerability of people in urban contexts is their reliance on essential services, such as health care, water, sanitation and electricity. The services are beyond the technical capacity and the direct physical control of the residents and can be in a resilient or a vulnerable position prior to any conflict (Photo 1).

Essential urban services are increasingly vulnerable. The ever-increasing sophistication of large-scale infrastructure (e.g. climate-controlled hospitals, sophisticated water and wastewater treatment plants) is reliant on the availability of specialist expertise (e.g. doctors, engineers, operators and technicians), potentially fragile governance structures (e.g. IT-dependent administrative structures) and complex logistics (e.g. the procurement and delivery of spare parts, consumables, equipment and heavy machinery).

Large scale. Because of the relatively large spatial scale of urban contexts, disruption to an essential service can have a large-scale impact. The destruction of a single power line can result in an electricity blackout across an entire neighbourhood (comprising 200,000 people, for example), including hospitals, health centres, and water pumping and treatment stations. Urban areas are



Photo 1. Urban residents are highly dependent on essential services but do not usually have the means to restore them. Collecting water in Mostar, Bosnia-Herzegovina, 1993.

typically also the location of referral systems, such as teaching hospitals or regional prisons; the impact of disruption to these networked services therefore extends far beyond the city core.

Density and diversity of communities and authorities. Densely populated urban areas are not only at greater risk from epidemics; they are also settings in which people can more readily clash with each other along opposing political, sectarian or tribal lines or across municipal political borders as well as with authorities. The number of people brought together within a city can increase very dramatically as a result of migration driven by heavy armed conflict, compounding economy-driven rural-to-urban migration. The synergies or tensions that exist between different groups in cities are often reflected in their protection, or abuse, by parties to the conflict, including armed non-State actors. Vulnerable communities may also be spread throughout the urban area, making assistance logistically difficult.

Asymmetric levels of development and service. The resultant informal settlements (e.g. slums, peri-urban neighbourhoods or IDP camps) are often not well served by municipal services and rely on self-organization to provide essential services – possibly (again) in conflict with the local authorities. For political or other reasons, even formal parts of the city may be intentionally neglected by the authorities in control at any given time during the conflict. Different parts of the same urban area may thus have very different levels of essential services and needs.

Stressful population movements. The size and shape of cities reflect waves of socio-economic development experienced locally, nationally and globally. An

outward flux of people during periods of hostilities can occur just before an inward movement of people seeking shelter from conflict in other cities – and both can follow years of rural-to-urban migration driven by changes in the national economy. Large influxes of people into cities can significantly increase the pressure on the services relied upon by the host populations, especially if the quality of those services was poor to begin with. Infrastructure and institutions (relevant government ministries and local service providers) are thus key components of the social tensions that are an inevitable by-product of such migration (which includes, but is not limited to, the arrival of IDPs and/or refugees), and can dramatically affect acceptance of migrants by the host population.

Urban violence and other stressors. Armed conflict can come to a city just as a city can produce armed conflict. Particularly where there is endemic violence and a lack of (or alternatively, coercive) central control – and hence crime – armed hostilities can contribute to already existing tensions and possibly fuel the wider conflict. Highly populated areas are also vulnerable in specific ways to issues as diverse as social tensions and governance systems, climate change and natural disasters (Pelling 2003, Satterthwaite 2013), although the links with “urban warfare” remain inadequately understood. Furthermore, a number of different destabilizing events can also occur at the same time. Iraq is a good example of a situation of that kind; an armed conflict, the Syrian refugee crisis and consecutive years of drought have all played out simultaneously.

Opportunities in urban areas

Urban areas are also areas of capacity, resilience and innovation. Even with the underlying vulnerabilities noted above, urban areas also have a resilience that stems from close interpersonal relations and relative economic prosperity. This results in short-term coping mechanisms (such as the use of mobile electricity generators) and longer-term adaptation (neighbourhood-level private water treatment units) not usually seen in rural contexts. The wealth and family relations that generally exist in a city also allow far greater access to private funds for minor repairs and even reconstruction.

Some urban areas have a high profile and are well networked globally. Some large cities are home to political authorities, diplomats or media and well linked beyond their physical limits to the rest of the world. In such cases additional international attention may be paid to the conflict and substantial financial resources sent to the cities, although such funds are typically intended to support individuals rather than essential urban services *per se*.

Urban areas also offer opportunities that are not usually available in rural areas, such as opportunities for humanitarian actors to work with new (and more professionally trained) partners (e.g. municipalities, service providers and/or creative private-sector entities) and the opportunity to conduct market analyses (see Forster in RedR 2013, Bryant and Campbell 2014).

1.3. Understanding essential urban services

Proposed definition of “urban context”

“Urban context” is defined in this report as *the area within which civilians vulnerable to disruptions in essential services reside and the network of components supporting those services*. This definition is based on the following reasoning.

As both Tokyo and a village of 2,000 people in Angola are officially classified as “urban,” there is clearly no agreed definition of the term (see UN-HABITAT 2009, Ramalingam and Knox-Clarke 2012). Definitions of “urban” are normally based on population density and/or a geographic area defined by municipal authorities. However, local and global economic and political forces are constantly changing the way people live and where they reside, blurring the once clear distinction between “rural” and “urban” areas. However, critical components of essential services (e.g. electrical power plants, supply routes, water and wastewater treatment plants) are often located outside the city limits, as shown in Figure 1. Very distant active combat can thus have a dramatic effect on urban dwellers. Population or area-based definitions of “urban” are therefore wholly inadequate as a starting point for efforts to improve assistance for people affected by armed conflict.

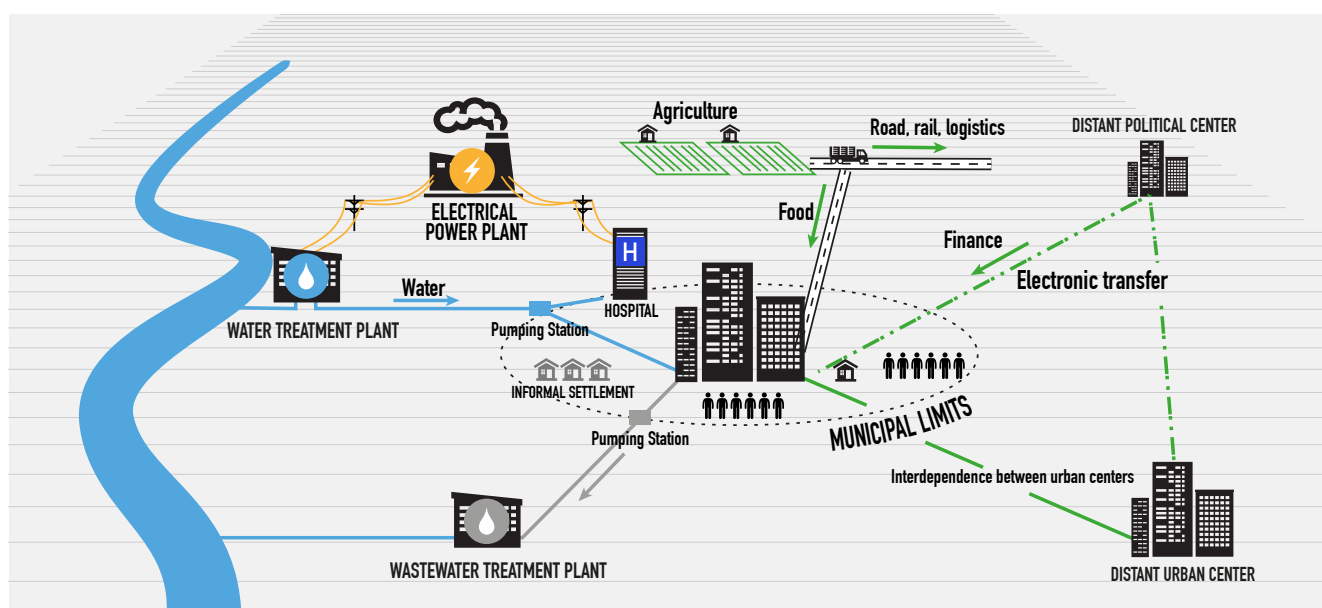


Figure 1. A model complementing the definition of “urban context,” which extends along supply lines beyond the municipal borders. It emphasizes the dependence of urban residents on essential services beyond their physical control as well as the interdependence of those services with each other and with those in other urban areas.

Figure 1 is based on the “hub and satellite” concept (US Army 2008). “Urban” in this sense may be most appropriately thought of as a *context* that considers the complex and interacting social pressures together with the essential services on which most people rely and that is limited only slightly by spatial scale.

Essential services: people, hardware and consumables

An *urban service* is understood in this report to mean the provision of commodities, actions or other items of value to an urban population. *Essential urban services* are understood to be those services that are vital to ensure the subsistence of the civilian population, including electricity, health, water, wastewater treatment and solid waste disposal.² All urban services require three elements in order to function: people (i.e. service provider staff, private-sector contractors and entrepreneurs), hardware (e.g. infrastructure, equipment, heavy machinery) and consumables (e.g. fuel, chlorine, medicines). It is appropriate to consider the baseline (i.e. pre-conflict) *capacity* and *quality* of each element of a service as serious underlying vulnerabilities sometimes exist that are merely exacerbated by the onset of armed conflict.³

All essential services depend on ...

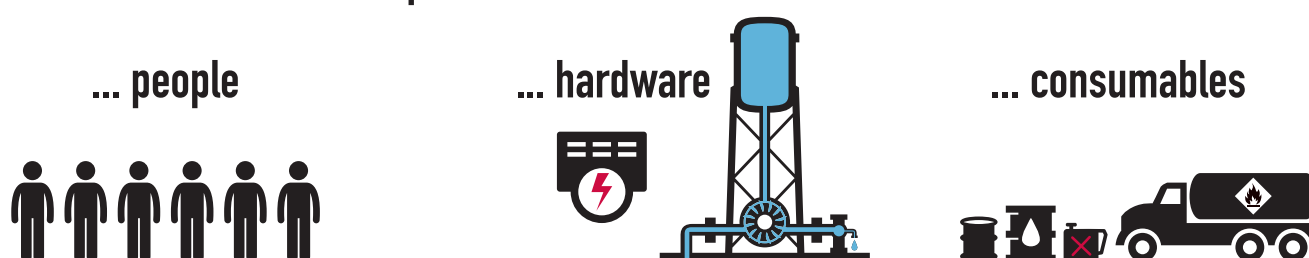


Figure 2. The three essential elements of urban services.

Disruption to an essential service is understood to occur when the functions of any of the critical people, hardware or consumables are compromised. Short-term disruption to a service may not have a major impact on the survival of the civilian population, while its deterioration over the long term brings about the cumulative impact on services that is discussed together with the related risks to public health (Chapter 2). Table 1 shows how various components are affected differently over time.

² The list of other “basic services,” such as radio and television, ports, banking, education, roads and telecommunications, is potentially non-exhaustive. It is likely to change with each context.

³ For example, a well-governed and well-funded service provider can be expected to be more resilient than a poorly governed one. Much the same applies to the quality and age of infrastructure and consumables. The capacity of any service prior to disruption is a measure of its vulnerability to the disruption; baseline data on the state of the service should consequently be collected.

Service	Critical people affected by...		Critical hardware affected by...		Critical consumables affected by...	
	Short-term disruption	Long-term deterioration	Short-term disruption	Long-term deterioration	Short-term disruption	Long-term deterioration
Electricity	- Operational and repair crews - Implementing staff (engineers)	- Implementing staff - Admin. staff - Maintenance staff - Payment collection	- Power stations - Maintenance/repair equipment	Entire systems	- Source (diesel, coal, river) - Fuel	Finances
Drinking and/or municipal water supply			- Source pumps - Water treatment plants - Pumping stations - Maintenance/repair equipment		- Fuel - Chlorine, other treatment chemicals - Filters	
Wastewater removal and treatment			- Wastewater treatment plant - Pumping stations - Maintenance/repair equipment		- Fuel - Treatment chemicals	
Primary health care	- Health-care staff (nurses, doctors) - Paramedics	- Admin. staff - Maintenance staff	- Hospital/Primary health care centre (PHCC) - Equipment for trauma patients - Ambulances - Back-up generators - Services (water supply, sanitation, solid waste and medical waste removal)	Functionality of the hospital/ services	- Oxygen - Medicines - Electricity/fuel - Blood - Body bags - Potable water supply	
Food production	- Farmers - Farm labourers	- Farmers - Retailers	- Harvesting and planting equipment - Vehicles (trucks) to take goods to market	Communication routes	- Seeds - Fertilizers - Pesticides - Fuel	

Table 1. Critical components of essential services affected by short-term and long-term disruption.

This report builds on this networked and multi-scale understanding of essential urban services in protracted armed conflicts. The types of impact are first conceptualized in the next section as direct, indirect and cumulative. This is followed by a discussion of key issues affecting responses and a suggested way forward.

2. IMPACT OF PROTRACTED ARMED CONFLICT ON ESSENTIAL URBAN SERVICES

This section discusses the importance of considering the cumulative impact of armed conflict on essential services and the resultant impact on the civilian population in terms of the increased risks posed to public health and well-being.

2.1. Direct, indirect and cumulative impact

Direct, indirect and cumulative impacts

Direct impact is used in this report to refer to the (usually) immediate and physical impact caused directly by armed conflict, such as damage to essential urban infrastructure, the death of technicians and repair crews, looting of hospital stores or service providers' warehouses and/or the removal of parts directly from service infrastructure (see Table 2). *Indirect impact* is understood to derive from direct impact, affecting an associated component of a system, usually in the short to medium term. An example is the "brain drain" that occurs following attacks on staff or shortages of spare parts due to a lack of funds with which to purchase them. These impacts can accumulate over time, resulting, for example, in a lack of maintenance planning due to insufficient long-term staffing and hence a lack of long-term service provision, inadequate or no infrastructure maintenance and/or machinery being run with poorly calibrated or poorly fitting parts. *Cumulative impact* refers to the long-term deterioration in the performance of essential services (i.e. service decline) through incremental direct and/or indirect impact(s) on one or more of the critical components of essential services (i.e. people, hardware and consumables). Field experience suggests that the cumulative impact is the most destructive and the most difficult to recover from. This is typically due to the large scale of the infrastructural rehabilitation work needed to restore any service or combination of services in urban areas.

Type of impact	Impact on critical people	Impact on critical hardware	Impact on critical consumables	Impact experienced by the general public
Direct	Casualties, restricted access due to security situation; drafting into armed forces; displacement	Destruction of or damage to infrastructure and/or equipment	Destruction of fuel reservoirs; destruction of stocks of chlorine; shortages due to looting	Brief interruptions in access to, reliability or quality of service; considerable public health risks
Indirect	"Brain drain"; retirement without replacement; no salary payments	Drops in pressure in water networks; disrepair of unused or misused equipment; negative coping mechanisms	Shortages (due to looting and/or lack of replacement); price increases on the black market	Continuous or persistent deterioration of access to, reliability or quality of service; considerable public health risks
Cumulative	Little to no long-term planning; loss of knowledge of system	Silting of reservoirs; leaks and increase in "non-revenue" water (unlicensed connections); mismatch of replaced items	Depletion of contingency stocks	Adaptation to poor reliability of service delivery, primarily through development of coping mechanisms; public health risks as a function of many other issues

Table 2. Examples of direct, indirect and cumulative impact. The least visible may be the most disruptive.

Experience and the analysis of the situation in Iraq and Gaza (Annexes A and B) confirm that direct damage to infrastructure from explosive munitions and attacks on critical staff typically attract the most attention. Perhaps the least visible and well-known of all forms of impact are interruptions in the supply of consumables caused by the nature of the conduct of hostilities or international sanctions, embargoes, and/or other restrictions on the provision of certain items. Whether direct or indirect, disruption to any of the three components can create vicious cycles of cumulative impact that spread to the other components over the short, medium and long term, as discussed in greater detail in the following sub-sections.

Impact on critical people

The deaths of hundreds of doctors after the 2003 invasion of Iraq (Burnham *et al.* 2009) underscores the importance of direct impact on critical people. While health staff seem particularly prone to assault (Rubenstein and Bittle 2010, ICRC 2011, Rubenstein 2012), there has been no documentation of the direct impact of armed conflict on electrical, water and sanitation crews. Killing and assaults result in fewer staff reporting to work and fewer staff willing to go to the field to conduct routine operation and maintenance work. They most probably also speed up the departure of critical staff from the combat zone.

Poor or complete lack of access to a service component is a second direct impact of armed conflict. Municipal electrical repair crews or maintenance teams are, for instance, often prevented from entering particular neighbourhoods owing to military restrictions or the risks posed by the conflict. Negotiating their safe access can very quickly and relatively cheaply mitigate very large-scale direct and indirect impacts.

Indirect impact on critical people. When armed conflict and sanctions (or embargoes and other restrictions) begin to affect a country's economy, essential services in urban areas tend to suffer indirectly, especially outside the capital (see US DIA 1991, AAWH 1997, COHRE 2008). Reduced cash transfers



Photo 2. A looted and deserted operation room in a water treatment plant, jeopardizing water delivery for tens of thousands of residents. (Baghdad 2003)

– particularly if they lead to salaries being reduced or delayed – can disrupt ongoing lower-priority projects and cancel planned projects outright or even reduce the likelihood of routine operation and maintenance from being carried out. The reduction in funds can also lead to staff demotivation. Staff who are able to do so may therefore either resign from their official position to work for higher-paying international organizations or the private sector or leave the country altogether.

Cumulative impact on critical people. Coupled with the uncertain investment climate that is observed during protracted conflicts, the reduction in funds and the flight of professional staff can also result in a lack of planning (for sustainable human resources, infrastructure or consumables) and hence reduced capacity to adapt from “normal” operations to emergency responses – in precisely the very

challenging type of context that requires the most planning. The national-level body responsible for water in Afghanistan, for example, was reduced from 34 engineers to two, and most of its stock, tools and vehicles were looted in 1992 and again in 2002 (Pinera 2011: 166). The cumulative impact of the “brain drain” (including the exodus of municipal staff and private contractors) and looting was felt in terms of reduced maintenance, deterioration of infrastructure, and a lower quality of the service provided for decreasing numbers of people (Photo 2).

Impact on critical hardware

Dealing with the *direct impact on critical hardware* – especially on infrastructure – is the main approach of many humanitarian agencies. Typical relief responses (such as arranging for water to be trucked to schools and IDP camps) take no account of the repairs needed to the municipal network and critical infrastructure, which are essential to ensure service delivery not only for households, but also for the emergency responses themselves. In contrast, humanitarian agencies with sufficient capacity can begin to rehabilitate damaged health centres and water networks, for example. However, the magnitude of the destruction is sometimes beyond the technical and financial capacity of humanitarian agencies and any such response is made far more difficult if their connections with the local authorities and/or service provider are not particularly well established. *Indirect impact on critical hardware* is also difficult to deal with, especially when it stems from coping mechanisms that the affected people have developed and now rely on. People living on the upper floors of apartment blocks often cope with the lack of water in their taps, for example, by installing small suction pumps in their homes to draw the water up from street level (Photo 3). In such instances, undue risks are at times taken



Photo 3. Direct and indirect impact starting to accumulate. It may be possible to repair these pipes but if water pressure remains insufficient, local residents are likely to install suction pumps – a “negative” coping mechanism that places the health of many more people at risk. (Southern Lebanon, 2006)

as a result of polluted water in the soil around the pipes inadvertently also being sucked up and contaminating the water supply; this cross-contamination can develop into a serious public health problem. Similarly, municipal authorities or service providers often respond to a lack of spare parts by “cannibalizing” other parts, i.e. removing functional equipment from a lower-priority part of a system to replace a more crucial part of the same or a different system. While both coping mechanisms are ingenious, their effects can be negative⁴ and are much more difficult to deal with over the long term. In fact, the cumulative impact can be even greater as a result (Photo 4).



Photo 4. Removing functional equipment from a lower-priority part of a system to a more crucial part of the same system to respond to an emergency need can create negative effects in the long run which will be more difficult to deal with. (Georgia, 2003)

Cumulative impact on critical hardware. In situations in which good quality replacement parts are difficult or impossible to procure, the systems from which parts are cannibalized will probably be rendered inoperable or function at reduced capacity. As a consequence, the pressure to deal properly with those parts of the system that are still functioning is reduced, inevitably leading to their repeated failure. The general deterioration of the service in question leads to residents connecting to power or water lines without authorization (i.e. a license) – another resourceful way of ensuring that basic needs are met. However, the authorities generally do not collect payment for the unlicensed connections and hesitate to, or cannot, stop their use – sometimes long after the armed conflict has ended. The funds required to address the service disruptions proactively thus remain in short supply. Once it has begun, the cycle becomes difficult to leave, as shown in Figure 3.

⁴ “Negative coping mechanisms” are understood in this report as mechanisms that meet needs in the short term but that increase dependence or needs in the long term, or increase the needs of others not benefiting from the mechanism.

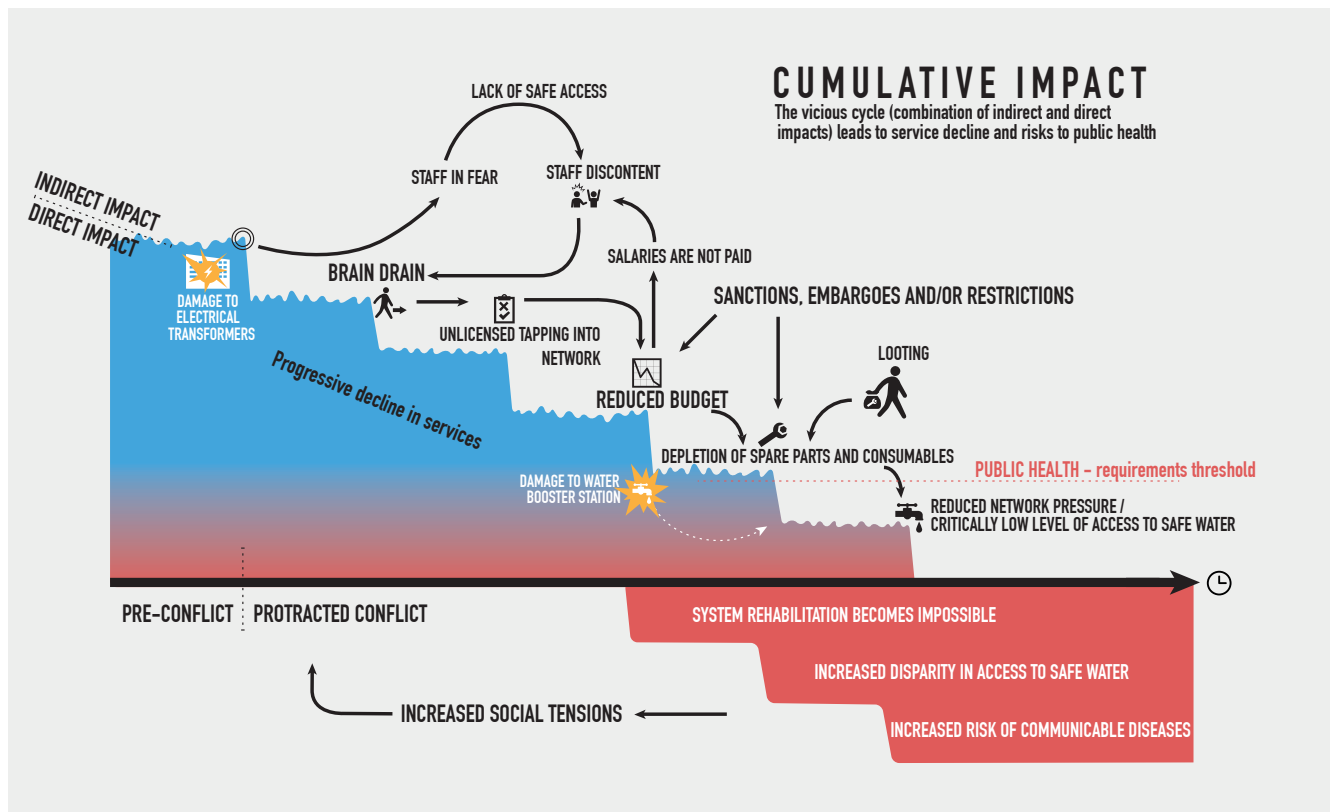


Figure 3. The vicious cycle of cumulative impact on essential services (exemplified by drinking water services). The cycle is influenced by direct and indirect impact (via people, hardware and consumables). The accumulation ultimately affects public health and may contribute to the very conflict which created it. The cycle of impact therefore lies within the cycles of conflict that characterize complex emergencies. Based on cases documented in Dushanbe, Tajikistan (Roberts 2000) and several Afghan cities (Pineria 2011).

Figure 3 illustrates how a reduction in staff follows attacks on technicians for instance, making follow-up of unlicensed tapping into the water network difficult. This results in reduced cost recovery by the municipal water department (and may be exacerbated by reduced funding from the central authorities), making it unable to ensure routine operation and maintenance or a ready supply of spare parts. The resultant reduced pressure in the network prompts people to install household-level booster pumps that, by creating a vacuum in the pipe, allow contaminated water to infiltrate the system and increase the risk to public health. The drop in service quality further reduces the invoice collection rates and dashes hopes of relatively straightforward network repairs that could be carried out if and when there is a lull in the fighting. The cumulative impact is thus not readily “reversible” as it leads to far more technically challenging work and longer lead-times – often at costs that are inhibitive to donors. Perhaps most importantly, the accumulation of impacts might also increase social grievances, exacerbate existing tensions and or even fuel the urban violence and armed conflict that was the original cause of the problems.



Photo 5. Melted wires and poles resulting from the destruction in 2014 of the warehouse of the electrical company of Gaza, which lost its capacity to react to breakdowns. Necessary repairs to the electricity grid had to be carried out by dismantling items such as transformers, wires and poles at less critical places and placing them in more critical places (e.g. hospitals). (Gaza, 2014)

Impact on critical consumables

As with critical infrastructure, the *direct impact on critical consumables* is related primarily to their destruction (Photo 5). Fuel reservoirs that have been damaged or destroyed, for example, can eliminate reserves for electrical power-generating plants (as in Saida, Lebanon, in 2006 (UNEP 2007)). Looting of water or electricity providers' warehouses is a classic example of *indirect impact on critical consumables*, as noted earlier in the case of Afghan cities (Section 2.1). This usually leads to hoarding of consumables or disruptions to supply chains, while the shortages drive up the price. Furthermore, when local and national stocks have been depleted, sanctions, embargoes and other restrictions can impede the procurement of new supplies of consumables – even when funds are available to buy them, as in Syria and Iraq (Annex A).

Cumulative impact on critical consumables. Critical consumables are probably affected more severely by protracted conflict and sanctions, embargoes and or other restrictions than by direct damage in a conflict context. Reduced budgets to buy spare parts or treatment chemicals (e.g. chlorine) or to repair equipment compound the generally lower quality of these items, even when they are available on the black market. This results in a general deterioration of the infrastructure, which also affects staff levels and motivation – the vicious (and interdependent) cycle shown in Figure 3. Recovering from the effects of cumulative impact is much more difficult than patching-up infrastructure.



Photo 6. Interconnectivity between essential services needs to be understood and properly integrated into an emergency response to a breakdown in order to avoid counterproductive effects. Retrofitting the broken water supply network to this quarter without addressing the damaged sewage evacuation network would increase the exposure of the population to public health risks by causing sewage to spill over into the streets. (Aden, 2015)

2.2. Factors affecting impact

Interconnectivity of essential services

Some essential services depend on others simply in order not to fail (Photo 6). The quality of health services is dependent on potable water and a reliable power supply, for example. Groundwater can also be contaminated by improperly maintained landfill sites (UNEP 2003), just as contamination of soil and groundwater is thought to have been caused by the release of polychlorinated biphenyls (PCBs) in hundreds of electrical transformers that were damaged in southern Lebanon in 2006 (Zeitoun *et al.* 2014). If the contamination is extensive, the need for decontamination efforts to be initiated quickly becomes a priority but is often beyond the capacity of most humanitarian agencies. The inability to adequately contain and remediate the contamination in a timely fashion can have prolonged environmental consequences. There is a clear benefit to dealing with the interdependences in a coordinated rather than an ad hoc manner, although few actors have technical competence across the various sectors. Although the provision of electrical generators is commonplace in humanitarian activities, support for the electricity provider or energy ministry is very rare but increasingly necessary (as is currently the case in Gaza and Syria).

Dependence on services outside urban areas

Essential services are also dependent on access to other goods and services beyond the control of the residents who rely on food, water, electricity, transport and communications that pass from clearly rural to clearly urban areas. Most of these “beyond urban” interdependences are crucially linked to financial flows. Particularly when economic sanctions are imposed on a country, funding allocated to essential services is reduced. Armed conflict in parts of a country can also block financial flows from the capital or remittances from abroad. In protracted armed conflict or donor-dependent areas, all services are ultimately reliant to a degree on such informal and external financial support as gaps in essential services are partly filled by the private sector for those who can afford it or by humanitarian agencies. Freetown (Sierra Leone) is an example of a situation in which all residents of the city were dependent on a single electricity transmission line from the Bumbuna hydroelectric plant (Pushak and Foster 2011). These dependences beyond city limits may thus make the occurrence of vicious cycles of cumulative impact more probable than expected. The residents of urban areas remain vulnerable to disruptions in essential services beyond their physical control to an extent that is probably greater than is commonly appreciated.

The cumulative impact of sanctions, embargoes and other restrictions

The long-term effect of economic sanctions in Burundi has been described as “problems continue to this day, long outliving the sanctions regime itself” (Bossuyt 2000, p. 20). A review of sanctions imposed on seven contexts shows that their cumulative impact on essential urban services is probably the result of a number of factors that vary in their particular admixtures according to the case, including:

- (a) *the state of the essential services prior to the imposition of sanctions.* The quality or capacity of any service is a function of the expertise and number of staff, the state of the infrastructure in terms of performance and the level of replacement or emergency stocks. Water, sanitation and electricity services were generally in good condition in Iraq prior to the United Nations’ imposition of sanctions, for example, but deteriorated substantially over the following years (Joyner 2003, Gordon 2010). Relatively less stringent sanctions imposed on Burundi had similarly severe consequences for the services as they compounded the existing slow pace of development (Hoskins and Nutt 1997, Bossuyt 2000);
- (b) *the type and breadth of sanctions,* e.g. economic (trade, financial), travel, military, diplomatic, cultural, sports, and whether targeted or wide;
- (c) *the length of time* for which the sanctions have been imposed;
- (d) *the actor(s) imposing the sanctions:* including the number of actors, the power of the actor(s) in the global sphere, the dependence of the sanctioned country on the actor(s) and the type of regime imposing the sanctions (universal, regional, multilateral or bilateral); and
- (e) whether States and or armed non-State actors give the necessary priority to ensuring to the best of their ability the provision of essential services for the population.

Attempts to “humanize” sanctions, embargoes and other restrictions or to reduce their negative impact have generally proved to have limited effect.

To start with, the bureaucracy involved in imposing and monitoring sanctions can be crippling. Field experience testifies to the slow start in the imposition of

sanctions when those imposing the sanctions have failed to adequately factor in the potential negative consequences for essential service delivery and perhaps the over-cautiousness of private-sector suppliers of equipment and spare parts. For instance, UNICEF-documented cases show that temporary “holds” on goods required by the electricity and transportation sectors had significant negative impacts on the maintenance and operation of essential urban services in Iraq (Gordon 2010, p. 64). Although it is actually intended to safeguard essential services, the onerous exemption process has also led to negative effects. In Burundi in 1996, for example, that process held up the delivery of water and sanitation equipment for six months, although it had been exempted from the sanctions at an early date (Bossuyt 2000). Field experience has shown that, in struggling to deal with the detailed formalities of sanctions, local authorities and or service providers are also prone to make time-costly mistakes related to specific dimensioning and the inattention of ordering complete sets of associated equipment. To make matters worse, they also may lack the expertise and capacity to install the equipment and or replacement parts because of the “brain drain” and the poor economic situation in the country in question.

“Dual-use”⁵ restrictions are particularly problematic for the maintenance of essential services. For example, over one thousand water tankers and wastewater evacuation trucks were denied entry into Iraq on the grounds of “dual use” because they were lined with stainless steel (Gordon 2010, p. 71). The impact in Gaza of being denied a vast range of material deemed “dual-use” is well known to those attempting to implement both emergency and development initiatives there (PTFP 2012). Similarly, chlorine gas used for water treatment is often banned from or difficult to transport within a country that is subject to an armed conflict. This is often based on the assumed risk that chlorine gas could be used as a weapon. However, the risks and consequences also need to be weighed against the heightened risk to public health if water is not adequately treated (for example, depriving hundreds of thousands in urban areas of access to safe water for domestic purposes).

Account also needs to be taken of less-considered effects of sanctions. They include, for instance, the fact that a lack of alternatives often means that actors in the water sector are left with little choice but to procure very poor quality materials, equipment and or consumables from the informal market as the only place where such goods, having bypassed the sanctions in place, are available. Sanctions also tend to mean that better quality goods are not available at all; for example, traders in higher quality goods (and lending banks) that break embargoes were fined a total of USD 1.7 billion between 2008 and 2012 (Standard Bulletin 2012), and thus effectively discouraged from attempting to do so. Additionally, European pump manufacturers have at times proved reluctant to sell such items if they were destined for Iraq or for Syria, even when the items were not among the banned exports, for fear of legal action against them.

Indirect impact of large population movements

Large population movements induced by armed conflict generate particular forms of indirect impact that must be factored into the analysis. Countries not directly involved in armed conflict are obliged to provide accommodation for hundreds of thousands of refugees, sometimes for several generations. Major urban centres in Pakistan and Iran, for example, have been home to refugees from the conflict in Afghanistan and their descendants for over 30 years. Whether refugees or IDPs, the influx of people to urban areas has a number of other

5 “Dual-use items” are goods, software and technology which are normally used for civilian purposes but may be used for military purposes.

indirect impacts, including increases in property or food prices, competition for jobs and pressure on essential services and natural resources. In the latter case, the rapid influx of Syrian refugees into northern Jordan has exacerbated the water crisis as a result of the overexploitation of already scarce groundwater resources. Each type of indirect impact can contribute to the social tensions that created the population movement in the first place, although the particular role of services is usually played down or simply not considered.

In many contexts, essential urban services do not keep pace with the “natural” population growth of cities. Water or electricity infrastructure, as well as referral hospitals, are designed for a specific size of population and are very expensive and technically difficult to extend once that target has been exceeded. Cities grow around the infrastructure, as in the case of Gaza City, further conflating rural and urban areas or metropolitan borders and the essential service lines on which they depend. A large conflict-induced influx of people can stretch already strained services to breaking point, thus increasing the discrepancies between the “haves” and “have-nots.” The degree of acceptance of new arrivals (IDPs or refugees) by host communities is clearly influenced by the quality of essential services prior to the influx, as well as immediately after and long after it has occurred. Once again, this is likely to increase social grievances and/or tensions and points to the importance of knowing the pre-conflict quality of the services in question and of developing an adequate response for both the short term and the long term. For instance, the large and rapid influx of Syrian refugees into the Bekaa valley in Lebanon, the region which ranked among the poorest in the provision of water (i.e. high levels of unaccounted-for water usage and low per capita water consumption) in the country, struggled to cope with ensuring adequate access to water for both the Lebanese host community and Syrian refugees. Improving the capacity of local authorities and service delivery prior to the armed conflict or during low-intensity conflict periods would serve to mitigate these indirect impacts and would often cost less than closed camps, which are expensive to run, or extensive rehabilitation or replacement of dilapidated essential service infrastructure after the end of a protracted armed conflict and or refugee crisis.

Impact on public health, and reliability of services

The importance of examining impacts over the short and long term becomes clearer when consideration is given to how the impact of protracted armed conflict (and/or sanctions) is “felt” by vulnerable communities in terms of their well-being, livelihoods, human security or public health.

Some international and national humanitarian organizations have developed well-adapted programmes, such as the ICRC’s Health Care in Danger programme, that focus primarily on direct impacts (ICRC 2011) but there is much less understanding or consideration of indirect and cumulative impacts. It is vital to take account of interconnectivity as the treatment of contaminated water and provision of safe water, for example, are crucial in any hygienic environment, as are electricity and the other services on which both water and wastewater treatment depends (Davis and Lambert 2002, JHS 2008, Hunter *et al.* 2010). The increase in the incidence of hepatitis, dysentery and typhoid in certain parts of Syria is attributed to the reduced access to safe drinking water, sanitation and hygiene in those areas (WHO 2013, UNICEF 2015) as well as to the absence of, or lack of access to, an effective country-wide immunization campaign since the onset of the conflict.

Statistical analysis has confirmed what is widely accepted as fact – more deaths and disability are caused by the “indirect and lingering effects” of armed conflict than directly or immediately after cessation of hostilities (Ghobarah *et al.* 2003).



T. A. Voeten/ICRC

Photo 7. Risk of a sustained increase in the incidence of endemic diseases is enhanced as the conflict drives more people and strains of illnesses into the city, particularly when the movements of people are coupled with poor general treatment of water and wastewater and incomplete immunization campaigns. Uncollected waste. (Aleppo, 2015)

Such effects are considered to stem from extended exposure to public health risks (due to reduced access to essential services and the potential introduction of disease by population movements) (Butala *et al.* 2010, Patel and Burke 2012, Rouhani *et al.* 2012), as well as from the reduced availability, allocation and efficiency of financial resources for public health systems (JHS 2008) – and thus lead to the vicious cycle of cumulative impact.

The cumulative impact of protracted armed conflict on public health is much more difficult to track than its impact on the quality or coverage of any essential service. As Hunter *et al.* (2009) show, one short disruption (i.e. lasting a day or week) to the drinking water supply – as might be expected at the start of hostilities – can greatly increase the probability of infection from diseases already present in the environment if the quality of the service was originally reliable. As people's immunity builds up with repeated disruptions to the water service, it is difficult to generalize the impact that any disruption would have on general health of the population. However, the risk of a sustained increase in the incidence of endemic diseases is enhanced as the conflict drives more people and strains of illnesses into urban areas, particularly when the movements of people are coupled with poor general treatment of water and wastewater, and incomplete immunization campaigns (Risebro *et al.* 2012) (Photo 7).

3. ISSUES WITH AN IMPACT ON EFFECTIVE ASSISTANCE

3.1. Long-term impact on services and people

The challenge of maintaining essential services in urban contexts subject to protracted armed conflict is conceptualized in Figure 4. The figure shows that the quality of the service or number of residents covered (shown to start near 100%) decreases cumulatively and progressively over time as a result of direct and indirect impacts. The impact on residents increases exponentially over time, although this is much more difficult to track accurately owing to the difficulty in obtaining related data.

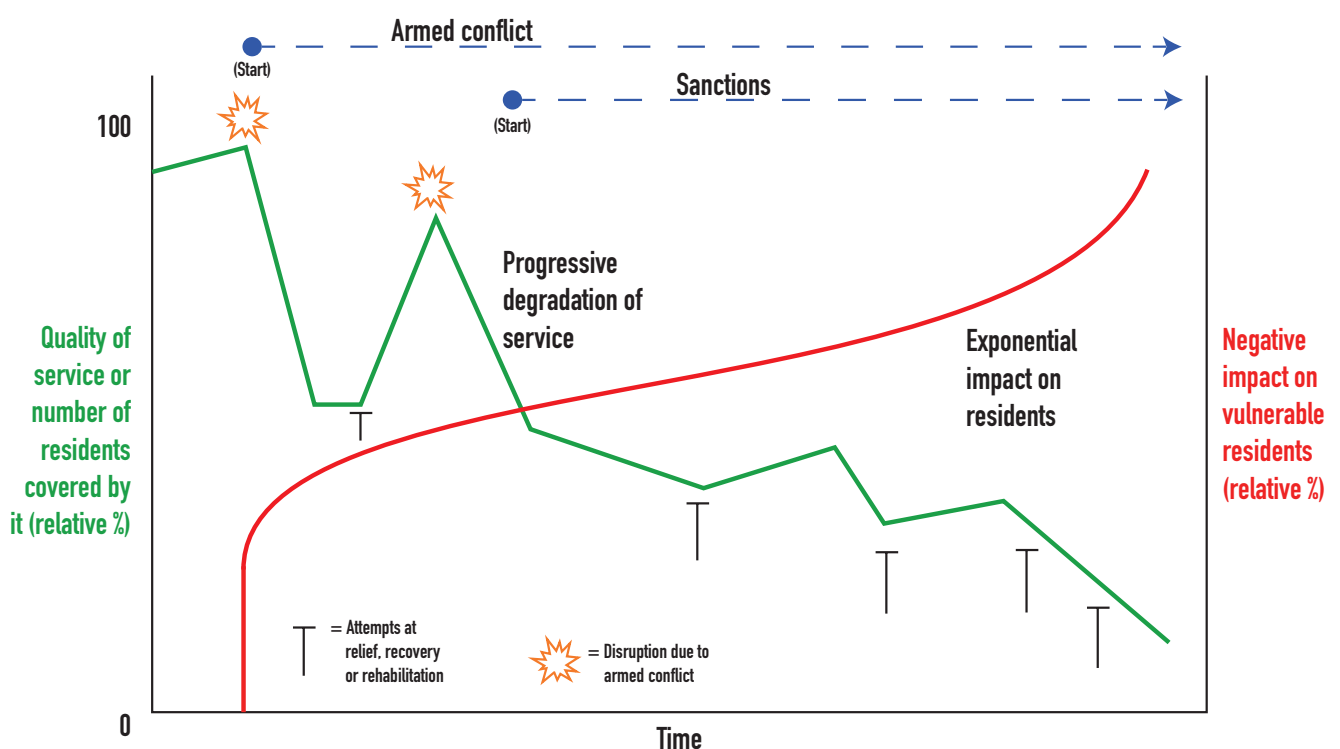


Figure 4. The deterioration in the quality of essential services, and increasing negative impact on residents, in urban contexts as a result of protracted armed conflict and/or sanctions. Modelled on International Federation 2012b, Figure 2.

The difficulty of mounting an effective response to the formidable challenge is compounded by the further blurring of the relief-development spectrum, mismatched funding, difficulties in forming partnerships, lack of effective coordination between development and humanitarian actors, and the challenges that face IHL, each of which is discussed in the following subsections.

3.2. Is relief-rehabilitation-development even relevant?

Distinctions between the stages of relief-rehabilitation-development response are rarely ever clear and are particularly blurred when considering essential urban services under protracted armed conflict. The aforementioned asymmetries in quality or coverage of services between neighbourhoods mean, for example, that multiple types of programme may be required simultaneously in the same city. ICRC interventions in Baghdad in 2010 covered the full spectrum; for example, large hospital and wastewater infrastructure rehabilitation projects were established to support the government's long-term development plans, alongside basic maintenance of existing health and water facilities (which could be labelled "reconstruction") and water-trucking programmes to informal settlements of IDPs – typical "relief" activity.

Training staff and pre-positioning spare parts may be useful when planning for natural disasters, refugee crises or short-term armed conflicts (e.g. AWWA 2001, CDCP-AWWA 2012) but are of little help when the municipal/service provider staff do not have safe access to carry out repairs and routine operation and maintenance, have been killed or injured, or have fled. The usual appropriate emphasis on planning exit strategies in emergencies (Sanderson *et al.* 2012) is in many ways counterproductive to the aims of actors committed to the challenges of *protracted* armed conflict. The stakes are particularly high as any "development" of urban areas can encourage further migration of the affected population from neglected areas to urban centre(s), which could feed yet again into vicious cycles of cumulative impact through negative coping mechanisms.

Many have called for an overhaul of the relief-reconstruction-development continuum (Duffield 1994, Keen 2007, Mosel 2014), while experience suggests that attempts to use existing tools and concepts to distinguish between the response stages are ineffective. Given the intricacy of the interconnectivity of urban services inside and outside urban areas, as well as between the services themselves, attempts to impose clarity through responses driven by artificial boundaries (e.g. attempts to shift from emergency relief to "development") are futile, to say the least. In other words, responses are context-dependent and the needs in urban areas can at times therefore necessitate an admixture of the stages classically referred to as "relief", "rehabilitation" and "development" at any given time during a protracted armed conflict. When silo-style responses are pursued – such as a classic "relief only" response to needs that extend far beyond relief – the response itself can contribute to vicious cycles of cumulative impact that are not even identified or omitted from the response and can thus ultimately run counter to humanitarian goals.

3.3. Funding that does not match the needs

The main shortcoming of funding models for humanitarian contexts has been well identified: short-term funding cycles which do not match the needs of the people or of authorities attempting rehabilitation (Olsen *et al.* 2003, Smillie and Minear 2003, Walker and Pepper 2007, McElhinney 2014). This is of particular concern for actors engaged in either restoring or stabilizing essential urban services during protracted armed conflicts. This shortcoming is particularly problematic in the types of conflict considered here, which start with a burst but may play out over decades. Furthermore, the conditions attached to the release of funds by many donors do not always match the needs in urban areas during a protracted armed conflict or in contexts of relative stability interrupted by repeated bouts of hostilities. In the latter type of context, such windows of opportunity provide an opportunity to engage in rehabilitation and emergency preparedness at the same time; that is, of course, if the funding mechanism in place is flexible enough to accommodate such activities.

Effective responses aimed at essential urban services in protracted conflict will require the confidence, assurance and flexibility that comes through secured, longer-term programme planning (i.e. planning that is tailored to the context) and hence multi-year funding. However, support for longer-term, low-visibility tasks that might be a means of avoiding vicious cycles of cumulative impact (e.g. hospital maintenance) is traditionally not forthcoming, even from pooled funding models (Macrae 2002, Willitts-King *et al.* 2007, Taylor *et al.* 2012). Hence, more context-adapted funding mechanisms are required in certain circumstances to enable a shift away from reactive repair of damage to infrastructure (direct impact) to the proactive preventative maintenance and rehabilitation (indirect and cumulative impact) necessary to stabilize or even to restore essential urban services. In the absence of funding appropriately adapted to such contexts, the continuation of a short-term necessity (e.g. water trucking) takes priority over avoiding the further exacerbation of humanitarian consequences in the longer-term (e.g. the municipal water supply system collapses and there is no longer a municipal water supply to be used for water trucking). Another example is that the natural reaction to water shortages in times of emergencies is all too often to drill another groundwater well without any concern given to groundwater levels or condition. In much of the Middle East, where groundwater depletion pre-dates many of the armed conflicts, priority should be given to demand-side rather than supply-side solutions, thus mitigating, or at least doing no further harm to, the longer-term humanitarian consequences caused by short-term responses.

The funding challenge is further compounded by the increasing alignment of bilateral assistance with foreign policy objectives – the so-called “securitization of aid.” Given the evolution of armed conflict towards asymmetric warfare in urban areas, funding will tend to be increasingly partial to some parties to a conflict rather than others and will not be driven by particular concern for the protection or restoration of essential services. The risk is then that the essential service decline that is the result of long-term neglect often affects large sections, if not all, of the population (i.e. civilians) in affected urban areas. It follows that political independence and the perception of neutrality become increasingly crucial.

3.4. Working with others

In assessing cumulative impacts (as in the cases of Iraq and Gaza, see Annexes A and B), it becomes clear that, of all the components of an essential service, “people” may be the most crucial. While the complexity of urban contexts makes partnerships particularly important, it also makes them trickier. The ability to engage with the numerous horizontal networks of informal governance overlaid onto vertical hierarchies is best acquired through experience. As there is no preferred model for such partnerships, the most relevant vulnerabilities and opportunities in the context will ultimately shape relations with authorities, beneficiaries, the private sector, the military and armed non-State actors.

Working with authorities and local actors

Effective partnerships with local authorities and service providers become indispensable in complex urban environments, far more so than for rural areas where people can organize themselves around less sophisticated services. In urban contexts, the relationship with local actors is the key factor in making any intervention sustainable, regardless of whether or not the armed conflict is protracted or if the response eventually enters a clear “development” phase. Local or national authorities are typically the sole actors responsible for the broader aspects of an urban service, in terms of both its history (documented through “as built” plans) and its future (through master plans). The legitimacy that is conferred by working with local municipalities, service providers and contractors is also crucial for both safety and access to data relevant to understanding the complex people-hardware-consumables system. A well-established partnership can even allow for enhanced remote management⁶ in insecure environments where humanitarian agencies are seeking to ensure that the population has access to essential services. The ICRC set up a remote management structure in Amman (Jordan) for operations in Iraq from 2003 to 2013; the structure was actually used from 2006 to 2008. Additionally, well-developed, long-term partnerships can at times ensure the continuity of assistance to municipal water departments and/or service providers when territory changes hands and access by humanitarian organizations becomes all but certain.

Actual or perceived neutrality must naturally be questioned when municipal authorities are associated with any party engaged in the armed conflict. Furthermore, both local authorities and non-State armed actors can be reluctant to encourage such cooperation because of their mistrust of some humanitarian actors or perceived threats to their own legitimacy and reputation. Even if mutual trust can be achieved, there are still a number of logistical challenges to overcome. The high staff turnover rate (among service providers and humanitarian agencies) coupled with the lack of central planning makes it technically difficult to see a longer-term project through to the end, for example. Relationships must be established, and then re-established, continually. Staff turnover often usually affects upper management positions more than lower-level positions, suggesting that it is just as important to establish good relationships with technicians, particularly since they have wide knowledge of the context and play a key role on the ground for the acceptance of external support from humanitarian actors.

⁶ “Remote management, defined here as an operational response to insecurity, involves withdrawing or drastically reducing international and sometimes national personnel from the field, transferring greater programme responsibility to local staff or local partner organisations, and overseeing activities from a different location.” (Stoddard, 2010)



Photo 8. The number of people affected by disruption to a service is the same as the number of those benefiting from its restoration and can run to hundreds of thousands. (Basrah, 2003)



Photo 9. Supervision of the construction by a local contractor of a wastewater treatment plant for the city of Rafah, from which 150,000 residents benefited. (Gaza Strip, 2009)

Working with beneficiaries

It is widely accepted that including beneficiaries in the conception, implementation and management is vital to the effectiveness, as well as to the sustainability, of any intervention. However, “community involvement” in urban areas is very different from the common understanding based on rural experience – not least because the community is often fractured – and it is more accurate to talk of sub-groups of residents or neighbourhoods than of entire communities.

Working with local people to repair or rehabilitate essential services in urban contexts also poses at least three particular challenges. First, urban beneficiaries may not have any sense of responsibility for a project because much of the hardware used to provide the services is far beyond their physical control (a distant electrical power station, for example). Second, depending on the neighbourhood, beneficiaries might have deep distrust or resentment of the official service providers with which humanitarian actors work (Svoboda 2015). Third, the positive impact of neighbourhood-based projects is normally felt only very locally and runs the risk of replacing or displacing larger-scale interventions. It is arguably more beneficial to restore water to an entire neighbourhood (by repairing the transmission line), for example, than to assist (possibly negative) household-level coping mechanisms. The importance of organizations striking a balance between the benefits and limitations of top-down and bottom-up approaches becomes very clear in such complex environments.

Working with the private sector

Local businesses might be called on to do more than simply implement projects as contractors (Photo 9). Field experience has shown that in many cases their knowledge of the complexities of the local society and obstacles faced is invaluable, particularly when the “brain drain” has depleted public authorities at the national and/or municipal level. Local businesses typically also have very useful insight into the “social fabric” of local authorities and can therefore offer helpful input in that area.

The technical complexity of many essential urban service projects also requires expertise and competence which is often unavailable in-house (i.e. in the municipal water department or with the service provider). The heavy equipment and labour required for large projects often has to be sub-contracted to local businesses. While cooperation with the private sector is a matter of routine for complex construction operations (e.g. restoration of hospitals or electrical power generating stations), the logic also applies to dealing with complex urban challenges, such as marshalling the expertise of urban planners, engineers and economists required to formulate a cohesive long-term strategy. The downside of inadequate in-house technical expertise and oversight ability of municipalities and or service providers (although this is not always the case) is the risk of excessive outsourcing and potentially a reduction in quality.

3.5. IHL and essential services: some challenges

The rules of international humanitarian law (IHL) and other bodies of law that are relevant to the protection of essential urban services during armed conflict are presented in Annex D and summarized in this report. Under IHL, each of the three components of any essential service (people, hardware, consumables) is covered by the general protection afforded to civilians and civilian objects. In addition, certain civilians (e.g. medical personnel) and civilian objects (e.g. objects that are indispensable to the survival of the civilian population) benefit from special protection, i.e. specific rules apply to certain persons and objects. Furthermore, IHL prohibits attacks that are expected to cause excessive incidental loss of civilian life, injury to civilians, damage to civilian objects or a combination of those impacts, and obliges attackers to take all feasible precautions to minimize such loss, injury or damage (Photo 10).

Despite this protection, there are several key challenges that arise in part from lack of respect for IHL in some contexts as well as from the weaponry used in urban areas subject to armed conflict. As the work being carried out on “explosive weapons in populated areas” shows, some weapons can have humanitarian consequences far beyond their impact zone (ICRC 2015a). This is particularly the case for essential services, given their highly interdependent nature – for example, fragments/shrapnel damaging the electrical panel of a water booster station with consequent cessation of the flow of water to a hospital or a whole neighbourhood.



Photo 10. Smoke billows out of the Republican Palace during an air strike in Southern Yemen. (Taiz, 17 April 2015)

Furthermore, IHL does not address all the specific challenges arising from armed conflict in urban areas. This can give rise to ambiguities in the interpretation of existing rules of IHL when applied to urban warfare.

One such challenge is that IHL includes object-specific protection and does not expressly acknowledge the *interconnectivity* or the increasing complexity, and thus vulnerability, of essential services in urban areas. This interconnectivity can and ought to be taken into account through the rules of proportionality and precautions in attack. The ICRC takes the view that parties must consider not only direct effects when planning an attack, but also the foreseeable reverberating effects on civilians and civilian objects. For example, parties must consider the foreseeable indirect effects resulting from incidental (collateral) damage to electricity supply systems. In practice, however, it may be difficult to determine what is foreseeable and what information is available on the interconnectivity of the services and possible back-up systems.

Moreover, IHL does not expressly address the *cumulative* impact of protracted conflict on access to essential services (see Section 2.1). Although the rules on the conduct of hostilities do not specifically state that an attacker must take account of the decreased capacity of essential services caused by previous attacks, to the extent that such decreased capacity is foreseeable, it must be taken into account. Attackers are obliged to consider the direct and indirect effects of an attack on civilians and civilian objects. Arguably, such an assessment would only be possible if account were taken of the state of the civilian objects at the time of the attack. For example, if a water treatment plant is operating at 50% of its capacity owing to previous damage, the direct and indirect effects on civilians caused by further damage to the plant will be more significant than if the treatment plant were fully functioning.

This section has briefly raised some of the challenges regarding protection of essential services under IHL. However, ensuring the protection of essential services begins first and foremost with better respect for existing rules of IHL by parties to armed conflicts in densely populated areas.

4. THE CALL FOR A BETTER APPROACH TO ASSISTING AFFECTED PEOPLE

The limitations of assistance provided for people during protracted armed conflict in urban contexts are becoming increasingly evident in the Middle East and beyond. The analysis in this report suggests that it is possible to provide improved assistance if the interconnectivity of essential urban services is taken into account within a longer-term planning approach. This is easier said than done, however, when long-established humanitarian responses have been informed by ideas about the nature of humanitarian consequences and needs during protracted armed conflict that may actually be far from reality (e.g. distributing bottles of water rather than rehabilitating water supply systems). It is likely that collective efforts will continue to focus on addressing the direct impacts of armed conflict for a while to come, but clear steps should meanwhile be taken to lay the foundations for a better approach.

4.1. The core issues

This report has generated a number of core issues that must be addressed by all concerned for the approach to succeed, notably:

- The *paradigm* to replace the relief-rehabilitation-development continuum;
- Strengthening compliance with IHL;
- The impact of the deterioration of essential urban services, specifically on *public health*;
- Current humanitarian operations/practice, including the length of current *planning* periods, *relationships* with local actors and the local population, and technical *capacity and competences*;
- The flexibility and duration of *funding* schemes and structures;
- Further research to address knowledge gaps in support of the issues listed above.

4.2. The path to a better approach

We suggest that the core issues are best addressed by pursuing a path of acknowledgement, discussion and action. To start with, the magnitude of the challenge must be allowed to induce a shift in our thinking. *This requires acknowledgment of:*

- (a) the sheer *scale* of the challenge;
- (b) the *duration* of the challenge;
- (c) the multifaceted *interconnectivity* of essential services;
- (d) *cumulative and indirect impacts* as well as direct impacts;
- (e) the politics of a highly *securitized* operating environment;
- (f) the significant *shortcomings* resulting from gaps in evidence and analysis;
- (g) challenges faced as a result of lack of respect for the rules of *IHL*;
- (h) the need to rethink the *relief-rehabilitation-development spectrum*; and
- (i) *funding* that does not match the duration or scale of the needs.

The next step is for *all involved* to *discuss the extent to which these factors call for a new way of thinking*. Is it enough to accept the present situation, following decades of lessons learned and partial reforms after assessing failures, or is it more effective to attempt a clean break? Efforts to link relief, rehabilitation and development activities (Mosel and Levine 2014) and debates about transitional development assistance (BMZ 2013, Wild *et al.* 2015) are steps in the proposed direction, although the aforementioned particular features of urban services suggest that ideas could be taken further at an earlier stage. *Building an effective protection dialogue based on IHL* is vital to ensure that States and other actors involved begin to address the interconnectivities of essential services and the cumulative impact of protracted armed conflict. This particular dialogue might also entail interpreting the growing evidence of indirect impacts of protracted conflict and discussing the foreseeable reverberating effects that have to be taken into account in accordance with the rules of proportionality and precautions in attack. This will inform the ongoing work on the use of “explosive weapons in populated areas.”

Local and international implementing agencies should then consider the implications for their own operations. Planning needs to be extended to multi-year programming (the actual duration being dependent on the context) if justice is to be done to the severity and complexity of the challenge. A step in this direction would be supported by *demonstrating the need for improved funding schemes* that match the scale and duration of the challenges that they are intended to meet. Field staff are well suited to collecting such evidence, and their documentation of direct and indirect impacts could be captured by new reporting structures.

The general goal would be to avoid vicious cycles by identifying and responding to indirect as well as direct impact – as part of a long-term strategy that promotes proactive planning. This means that during the early stages of any armed conflict, humanitarian agencies should be more assertive and structured in initiating programmes that factor in the anticipation of the eventual arrival (or not) of development agencies, as well as preventive maintenance. Development agencies should coordinate more effectively over the long-term with each other and with humanitarian agencies, most importantly with the relevant local actors. Good relationships will help to ensure that work continues even when conducted on a remote basis, facilitate sharing of pre-conflict baseline indicators (data

and information) and keep all relevant parties informed about their planned re-engagement once the conflict has ended. The undertaking would require the identification and analysis of cumulative impact, with particular attention being paid to measures that might lead to vicious cycles and hence large-scale deterioration of essential urban service systems.

Ultimately, local and international implementing agencies will also have to *improve their logistical and technical capacity* to deal with the complexity of the challenges, including (but not limited to) the development of technical competences that cover urban water, sanitation and energy services. Failing that, local and international implementing agencies should evaluate their support of local coping mechanisms, which, as this report shows, can at times be counterproductive or dangerous to others.

Donors should reconsider their funding schemes to ensure that they match the scale and duration of the challenge. Relief, rehabilitation and development efforts will be much more expensive and take far longer if humanitarian agencies in coordination with local service providers are unable to mitigate the consequences of indirect and cumulative effects. Twelve-month funding designed for disaster relief or very short conflicts inhibits the design and implementation of adequate responses for all agencies working on stabilizing and/or restoring essential urban services in protracted armed conflicts. To appropriately address the complexity of essential urban services during protracted armed conflicts, local and international agencies (irrespective of whether they are “development” or “humanitarian”) will require larger budgets that cover a longer period and that are easily switchable to respond to emergency needs if need be, as tested in Yemen (McElhinney 2015). Furthermore, donors often have access to humanitarian updates and detailed information from standard reporting requirements. This insight could be more effectively used by technical specialists within donor agencies to engage the political elite within their own establishments with the aim of increasing the awareness of the consequences for essential urban services during times of protracted armed conflict and the resulting need for funding that could extend well beyond the traditional humanitarian response to longer-term development work.

Required evidence beyond that identified above obliges well-designed investigations to document the impact on public health, the influence, both negative and positive, of coping mechanisms and adaptation methods on the provision of essential services, and the role played by disruption to services in contributing to ongoing armed conflict.

4.3. Continuing the discussion

Ultimately, the path to a better approach requires further discussion both within and beyond the humanitarian sector. Taking steps along this path will serve not only to inform the development of a better approach to assisting people affected by armed conflict in urban areas before, during and after the fighting, but also towards achieving a consensus that reinforces the paradigm shift needed to address the challenges discussed in this report.



Photo 11. A father walking with his children in their neighborhood after it has been destroyed by shelling. (Zaddiqin, Southern Lebanon, 2006)

ANNEX A – SUMMARY OF THE IRAQ STUDY

The following summary is based on a review of over 170 internal ICRC documents dating from between 1991 and 2012, one interview with a senior WatHab engineer and a group interview with nine senior WatHab engineers.

Drivers

(1) Iran-Iraq War 1980-1988; (2) Gulf War: Iraq's invasion of Kuwait (August 1991), UNSC-imposed sanctions⁷ (August 1991) and US attacks on Iraq (January-February 1991, 1998); (3) US/UK invasion of Iraq (2003-2011); (4) non-international armed conflict (NIAC, ongoing).

Pressure

Armed conflict between armies mainly through the use of aircraft, surface-to-air and surface-to-surface missiles; asymmetric armed conflict between US/UK troops and Iraqi insurgents. A UNSC-imposed, full financial trade embargo outlawing the import of anything but "essential needs." The sanctions were "eased" in 1995 under UNSC Resolution 986 – which established the Oil-for-Food Programme – but continued until the US/UK-led invasion (international armed conflict, IAC) in 2003. The sanctions (and restrictions on "dual-use" items) had a major impact on the national economy, affecting many of the areas presented below. It is entirely plausible to hold that the sanctions regime was manipulated to favour some parts of the country over others.

State of drinking water services in Iraq

Pre-sanctions: The water supply system in many Iraqi cities was considered to be generally in line with international standards, i.e. built to British standards, safe but highly energy-dependent. Operations and the maintenance of many of the water treatment plants (WTPs) were conducted by foreign consultants, who were also training Iraqi engineers. The drinking water service was thus dependent on foreign labour and equipment. In the early 1990s, WTPs operated at 30-70% capacity and wastewater treatment plants (WWTPs) at 0-70%. By the mid-1990s, these figures were 40-50% and 10% respectively.

Impact on drinking water services in Iraq

Direct, indirect and cumulative impact on people. The government's ability to support essential services was affected by the embargo because of lack of funds. Soaring inflation was not offset by water authority salary increases, resulting in a loss of skilled workers as early as in 1991. Salaries dropped as inflation soared and staff became demotivated and demoralized. Throughout 1991-1992, the shortage of qualified staff meant that few people were available to install equipment or even to explain the problems to ICRC staff on field assessment visits. The water boards were also said to be suffering from an "inner embargo," with no central government assistance (funds, transportation, fuel) for the sector. The "brain drain" from government/municipal employment continued during the 2003 invasion (international armed conflict, IAC) and remains ongoing.

7 UNSC: United Nations Security Council.

The situation was exacerbated by a “natural brain drain” over the two and a half decades under consideration as the qualified people that had remained in service reached retirement age. The intricate knowledge that these skilled workers had of the “patchwork” systems that had been created is irreplaceable or not easily transferrable to younger, less well-trained staff.

*Direct, indirect and cumulative impact on **hardware**.* From the start of the war, electricity shortages caused by the bombing of most major electrical power-generating stations had a direct effect on water provision. A long period of electricity shortages followed partial restoration of the service. In 1998 the water authorities were instructed to rely on generators to relieve pressure on the national electricity grid – a good solution since generators could be readily fed by fuel that was cheap and in abundant supply but only a short-term solution as unmaintained generators soon fell into disrepair. Water supply tankers were often inoperable because of lack of spare parts and/or the reluctance of drivers to work for the poor wages offered.

The economic pressure meant that management of the water and sanitation infrastructure suffered from an “enormous investment deficit” from 1991 onwards. The investment and staffing problems led to a quick ban on testing water quality or public discussion of the issue. The persistent problems (albeit not the ban) continued after the government was toppled in 2003, and the lack of capacity to operate WTPs and WWTPs has continued to ensure short life spans for all equipment until today.

*Direct, indirect and cumulative impact on **consumables**.* Lack of quality spare parts became a central item in the disruption to drinking water services. From mid-1991 onwards chlorinators and alum dosers were in disrepair. This led to “cannibalization” as parts stripped off less critical equipment were used to replace parts of more critical equipment.

The trade embargo was particularly effective here as most of the parts required were for (high-quality) European equipment (e.g. German dosing pumps). The parts were unavailable partly because of cost and partly because European companies not only tended to respect the sanctions, but were at times overly cautious and declined to supply items and materials even when they were not covered by the sanctions. Chinese spare parts were a small fraction of the cost of the European equivalents and were available on the black market; however, their quality was very poor. Shortages of construction material (particularly cement) also hampered reconstruction efforts.

Chlorine and alum were in acutely short supply in the early 1990s, leading to the improper use of bleaching powder by some authorities in southern cities. Chlorine imports arranged through UNICEF improved the situation until chlorine was exempted from the embargo (under the 1996 “oil-for-food” memorandum of understanding). Inadequate maintenance and a shortage of functional dosing pumps meant that chlorination was still not carried out throughout the country. Alum was produced locally but was of low quality. It is estimated that water purification chemicals used in 1997 contained 30 times more impurities than before the embargo. Similar problems persisted following the 2003 invasion, with cannibalization of parts, interruptions to electricity services and problems with procuring good quality spare parts and consumables continuing at least until 2008. This is attributed to the foreseeable time lag in restoring supply chains.

*Direct, indirect and cumulative impact on **health services**.* It is not clear to what extent the deterioration of water services affected public health levels in Iraq, although the extent to which the country was reduced from first-class health

services is (Salvage 2002, Dewachi *et al.* 2014). The system was unable to keep up with the overwhelming number of direct and indirect casualties of the war (in terms of incomplete immunization programmes and inability to meet mental health needs). Invaluable for identifying *cumulative* impacts and the effects of trade sanctions, the subsequent Medact reports (Farooq *et al.* 2003, Panch *et al.* 2004, Al-Naseri *et al.* 2008) build on the first report released and covered a period of six years.

Responses

It was, of course, not possible in 1991 to predict that Iraq was going to be subject to more than a decade of sanctions before being invaded and occupied. The responses developed by the ICRC were initially short-term in nature and became longer-term and more creative in the course of the 1990s. For example, a response to the lack of, or ban on, technicians for testing water quality was to supply doctors and other health centre workers directly with chlorine test kits. The ICRC also introduced the concept of “semi-sustainability” in 1991, in an attempt to maintain minimum operational capacity at a reduced number of WTPs. The difficulties with imports of spare parts meant these had to be prioritized into “most needed” rather than “all needed.” Through perseverance with the bureaucracy of the sanctions regime, the ICRC managed to ensure that 240 tonnes of high-quality spare parts, equipment and consumables entered the country between 1993 and 1996, although this was a fraction of what was needed. Experience also demonstrated that the Oil-for-Food Programme did very little to address the impact, in some cases worsening it (ICRC 1999). The quality of needs assessments and responses following the 2003 invasion is attributed to the long-term presence of the ICRC and the ability to maintain key staff throughout the period, in contrast to those developed by the occupying forces which eventually became responsible for “reconstruction.”

ANNEX B – SUMMARY OF GAZA STUDY

The following summary is based on over 30 internal ICRC documents dating from between 2011 and 2014, interviews with three senior management staff from the water authorities and a group interview with eight senior WatHab engineers.

Drivers

A large and rapid influx of Palestinian refugees in 1948 and 1967; Israeli occupation 1967-1995; Israeli blockade from 1994 onwards (particularly from 2007); and tensions in intra-Palestinian relations.

Pressure

Blockade of people and goods varying in intensity over the decades, unilaterally imposed. IDF operations: associated with the second *intifada* from 2000 to 2007; “Cast Lead” in December 2009/January 2010, “Pillar of Defence” in November 2012 and “Protective Edge” in July-August 2014.

State of drinking water services in Gaza

The sole source of freshwater is from the shallow coastal aquifer, which is notorious for its poor quality. As a result of over-pumping (creating saline intrusion) and seepage of contaminated storm water, untreated wastewater and agricultural run-off, it is estimated that 90% of the groundwater fails to meet WHO drinking water standards. Losses in the network are estimated at 50%. The Palestinian Water Authority (PWA) created in 1995 was supposed to regulate the municipal service providers but was involved in service provision soon after its establishment. The Coastal Municipalities Water Utility (CMWU) was established in 2005 to agglomerate the municipal services. The overlap of PWA and CMWU activities is exacerbated by NGOs and private neighbourhood-level desalinated water vendors. The election of Hamas in 2006 was followed by intra-Palestinian tensions and several rounds of hostilities during which the repeated destruction of the infrastructure by the Israeli military meant that some donor agencies were – and to a certain extent remain – reluctant to provide financial support. The local economy is too small to support itself and unemployment is very high.

Impact on drinking water services in Gaza

Direct, indirect and cumulative impact on people. The high rates of unemployment and poor quality of service mean that many people are unable or unwilling to pay their water bills, and collection rates have steadily decreased since 2006. PWA and CMWU staff rely on fixed-term donor-supported project funds and are routinely confronted with the symptoms of “donor fatigue.” There is an adequate level of technical expertise, even among young professionals, but too few jobs to ensure that they gain relevant experience. Staff of international private sector companies or international NGOs are discouraged from working in Gaza because of the lengthy time required to execute projects, due to Israeli restrictions on foreign nationals who work for aid or development agencies and on the entry of materials into Gaza.

*Direct, indirect and cumulative impact on **hardware**.* People have responded to the conflict and breakdown in governance by digging their own domestic or agricultural wells and tapping without licence into the municipal networks, thus exacerbating the reduction in the quality of the aquifer water. Electrical services come from Israel (~70%) and Egypt (~3%) and are also produced internally from a diesel-fed electricity generating station (~28%), which relies on diesel imports from Israel. Routine power cuts lasting 16-20 hours a day severely disrupt the water service. When there is sufficient fuel, the resultant over-reliance on generators leads to more breakdowns and greater reliance on spare parts that are difficult or take time to import. When there is insufficient fuel, the water supply and wastewater systems operate at very low capacity and it is not uncommon for untreated wastewater to be directly discharged to the sea. PWA efforts to build a large-scale desalination plant remain foiled by the blockade of goods (and “dual-use” restrictions), leading to donor reluctance (PWA 2011).

*Direct, indirect and cumulative impact on **consumables**.* The blockade officially allows all but “dual-use” items into Gaza, although in effect many goods experience considerable delays before being allowed entry. Such delays hamper maintenance and repair work, prevent the construction of new projects (e.g. to manage the coastal aquifer) and paralyse infrastructure upgrading plans. Water treatment chemicals requested by the authorities succeed in passing through the blockade thanks to the facilitation of the international community. Chemicals requested by the private sector (for example, for the neighbourhood desalinated water vendors) do not. Lack of funds prevents authorities from building up stocks and there is a clear donor preference for building new projects as opposed to paying for stocks of spare parts and consumables (or operations). Lack of fuel for maintenance vehicles is a further obstacle to routine maintenance or even adequate project follow-up.

Responses

Quality construction materials held up from the Israeli side can sometimes be purchased on the local market, although they tend to be lower in quality. The ICRC also relies on locally available resources, including materials from a local pipe factory and the use of sections of the old concrete wall on the Egypt/Gaza border, to line the ponds and sludge-drying beds at the Rafah WWTP.

ANNEX C – METHODOLOGY AND LIMITATIONS OF THE REPORT

The literature review on which this report is partly based was undertaken by researchers at the UEA Water Security Research Centre (Dr Mark Zeitoun with Heather Elaydi, Stephanie Hawkins, Charles Thompson and Ruth MacDougall). The review was limited to publically available documents in English and was biased towards water services. As a result, the report probably takes insufficient account of food and solid waste services.

Some of the research and methodological gaps identified in Chapter 4 may be addressed by extending the research undertaken in preparation for this report to include (a) unpublished (“grey”) literature as evaluations of the activities and programmes of donor and implementing agencies would yield more insight into the impact of sanctions, the limitations of funding, etc.; (b) interviews with more practitioners, particularly outside the water and sanitation sector as the insight provided by people experienced in service delivery (and repair) would serve considerably to triangulate the findings; and (c) much greater review and synthesis of research on armed conflict and health services, for example to establish links between disruption to services and primary health-care records and to learn from the protection of health services under IHL.

ANNEX D – PROTECTION OF ESSENTIAL SERVICES UNDER IHL AND OTHER BODIES OF LAW

Table D1. Protection of essential services under IHL

	Legal rule (treaty and customary IHL)	IAC/NIAC	Interpretation
GENERAL PROTECTION AFFORDED TO ALL CIVILIAN OBJECTS			
Distinction	Civilian objects shall not be the object of attack or of reprisals. Civilian objects are all objects which are not military objectives. (API Art. 52(1); CIHL Study Rules 7, 9 and 10) In so far as objects are concerned, military objectives are limited to those objects which by their nature, location, purposes or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization, in the circumstances ruling at the time, offers a definite military advantage. (API Art. 52(2)) In case of doubt whether an object that is normally dedicated to civilian purposes, such as a place of worship, a house or other dwelling or school, is being used to make an effective contribution to military action, it shall be presumed not to be so used. (API Art. 52(3))	IAC/NIAC	The notion of military advantage is not defined but it must be defined and not hypothetical. Rivers, lakes and groundwater resources are generally considered civilian objects (Hulme 2004). The natural environment is considered to be made up of civilian objects (Hulme 2010) and is thus covered by the protection afforded to civilian objects, as well as by special protection afforded to the natural environment (see Table D2). Some States do not accept that API Art. 52(3) is customary law.
Proportion-ality	Attacks that may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated, are prohibited. (API Art. 51(5)(b); CIHL Study Rule 14)	IAC/NIAC	The rule applies at the time of launching the attack (not retrospectively). “Expected” effects include foreseeable reverberating (or indirect) effects on civilian objects.

Precautions in attack	In the conduct of military operations, constant care shall be taken to spare the civilian population, civilians and civilian objects.	IAC/NIAC	The obligation to take constant care to spare civilians and civilian objects is broader than the other precautionary measures as it applies to the context of “military operations” as a whole, rather than merely to specific “attacks” (Quéguiner 2006).
	(a) Those who plan or decide upon an attack shall: (i) do everything feasible to verify that the objectives to be attacked are neither civilians nor civilian objects and are not subject to special protection but are military objectives within the meaning of paragraph 2 of Article 52 and that it is not prohibited by the provisions of this Protocol to attack them; (ii) take all feasible precautions in the choice of means and methods of attack with a view to avoiding, and in any event to minimizing, incidental loss of civilian life, injury to civilians and damage to civilian objects; (iii) refrain from deciding to launch any attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated; (b) An attack shall be cancelled or suspended if it becomes apparent that the objective is not a military one or is subject to special protection or that the attack may be expected to be disproportionate. When a choice is possible between several military objectives for obtaining a similar military advantage, the objective to be selected shall be that the attack on which may be expected to cause the least danger to civilian lives and to civilian objects. (API Art. 57; CIHL Study Rules 15-19 and 21)		In cases of doubt regarding the military nature of an object, additional information must be obtained before an attack is launched (Quéguiner 2006). The obligation to take precautionary measures is an obligation to act in good faith with regard to taking practicable measures (Fenrick 2001).

SPECIAL PROTECTION OF OBJECTS INDISPENSABLE TO THE SURVIVAL OF THE POPULATION

Objects indispensable to the survival of the civilian population	It is prohibited to attack, destroy, remove or render useless objects indispensable to the survival of the civilian population, such as foodstuffs, crops, livestock, drinking water installations and supplies and irrigation works, for the specific purpose of denying them for their sustenance value to the civilian population or to the adverse Party, whatever the motive, whether in order to starve out civilians, to cause them to move away, or for any other motive. (API Art. 54(2); APII Art. 14; CIHL Study Rule 54) This protection does not apply if the objects are used by an adverse party: (a) as sustenance solely for the members of its armed forces; or (b) if not as sustenance, then in direct support of military action, provided, however, that in no event shall actions against these objects be taken which may be expected to leave the civilian population with such inadequate food or water as to cause its starvation or force its movement. (API Art. 54(3))	IAC/NIAC	During the negotiations regarding the Elements of War Crimes under the Rome Statute, it was recognized that “starvation” covers the more general meaning of deprivation of insufficient supply of some essential commodity, including indispensable non-food items such as medicines and blankets. The meaning of “for the specific purpose of” has not been settled: some States (e.g. France and UK) insist that attacks are only prohibited if they are carried out for the specific purpose of denying sustenance to the civilian population;¹ other States prohibit attacks on objects indispensable to the survival of the civilian population.²
---	--	-----------------	--

SPECIAL PROTECTION OF HEALTH SERVICES

Civilian hospitals	Civilian hospitals organized to give care to the wounded and sick, the infirm and maternity cases may in no circumstances be the object of attack, but shall at all times be respected and protected by the Parties to the conflict. (GCIV Art. 18) The protection to which civilian hospitals are entitled shall not cease unless they are used to commit, outside their humanitarian duties, acts harmful to the enemy. Protection may, however, cease only after due warning has been given, naming, in all appropriate cases, a reasonable time limit, and after such warning has remained unheeded. (GCIV Art. 19)	IAC IAC	
---------------------------	---	-------------------------------------	--

1 France, Reservations and declarations made upon ratification of Additional Protocol I, and United Kingdom, Reservations and declarations made upon ratification of Additional Protocol I, cited in J.-M. Henckaerts and L. Doswald-Beck, *Customary International Humanitarian Law*, Volume I (“CIHL Study”), Cambridge University Press, Cambridge, 2005, p. 190. See also the military manuals of Australia, Ecuador, France, Germany, New Zealand, Spain, Sweden, the United States, and Yugoslavia, also cited in the CIHL Study, p. 190.

2 See, for example, the military manuals of Belgium, Benin, Canada, Colombia, France, Indonesia, Israel, Kenya, Madagascar, Netherlands, Nigeria, South Africa, Switzerland and Togo, cited in J.-M. Henckaerts and L. Doswald-Beck, *Customary International Humanitarian Law Study*, Volume I (“CIHL Study”), Cambridge University Press, Cambridge, 2005, p. 190.

Medical personnel	Civilian medical personnel shall be respected and protected. (API Art. 15(1); APII Art. 9; CIHL Study Rule 25) Attacks against medical personnel are prohibited. (CIHL Study Rule 30) Persons regularly and solely engaged in the operation and administration of civilian hospitals, including the personnel engaged in the search for, removal and transporting of and caring for wounded and sick civilians, the infirm and maternity cases, shall be respected and protected. (GCIV Art. 20)	IAC/NIAC IAC/NIAC IAC	
Medical units	Medical units shall be respected and protected at all times and shall not be the object of attack. (API Art. 12(1); APII Art. 11(1); CIHL Study Rule 28) The protection to which civilian medical units are entitled shall not cease unless they are used to commit, outside their humanitarian function, acts harmful to the enemy. Protection may, however, cease only after a warning has been given setting, whenever appropriate, a reasonable time-limit, and after such warning has remained unheeded. (API Art. 13; APII Art. 11(2); CIHL Study Rule 28)	IAC/NIAC	
Medical vehicles and transports	Medical units and transports shall be respected and protected at all times and shall not be the object of attack. (API Art. 21; APII Art. 11(1); CIHL Study Rule 28 and 29) The protection to which medical units and transports are entitled shall not cease unless they are used to commit hostile acts, outside their humanitarian function. Protection may, however, cease only after a warning has been given setting, whenever appropriate, a reasonable time-limit, and after such warning has remained unheeded. (API Art. 13; APII Art. 11(2); CIHL Study Rule 28 and 29)	IAC/NIAC	

Occupied territories	To the fullest extent of the means available to it, the Occupying Power has the duty of ensuring the food and medical supplies of the population; it should, in particular, bring in the necessary foodstuffs, medical stores and other articles if the resources of the occupied territory are inadequate. (GCIV Art. 55(1))	IAC	
	To the fullest extent of the means available to it, the Occupying Power has the duty of ensuring and maintaining, with the cooperation of national and local authorities, the medical and hospital establishments and services, public health and hygiene in the occupied territory, with particular reference to the adoption and application of the prophylactic and preventive measures necessary to combat the spread of contagious diseases and epidemics. Medical personnel of all categories shall be allowed to carry out their duties. (GCIV Art. 56(1))	IAC	
ADDITIONAL OBLIGATIONS RELATING TO WATER SERVICES			
Dams and dykes	Works or installations containing dangerous forces, namely dams, dykes and nuclear electrical generating stations, shall not be made the object of attack, even where these objects are military objectives, if such attack may cause the release of dangerous forces and consequent severe losses among the civilian population. (API Art. 56; APII Art. 15)	IAC/NIAC	The rule only prohibits attacks that may cause consequent severe losses among the civilian population (Tignino, 2010).
	Particular care must be taken if works and installations containing dangerous forces, namely dams, dykes and nuclear electrical generating stations, and other installations located at or in their vicinity are attacked, in order to avoid the release of dangerous forces and consequent severe losses among the civilian population. (CIHL Study Rule 42)	IAC/NIAC	Protection under CIHL is not as strong as treaty law: API and APII protect dams and dykes against attack, whereas CIHL requires that “particular care must be taken.”

Natural environment	Care shall be taken in warfare to protect the natural environment against widespread, long-term and severe damage. This protection includes a prohibition of the use of methods or means of warfare which are intended or may be expected to cause such damage to the natural environment and thereby to prejudice the health or survival of the population. (API Art. 55(1)) Attacks against the natural environment by way or reprisals are prohibited. (API Art. 55(2)) Methods and means of warfare must be employed with due regard to the protection and preservation of the natural environment. In the conduct of military operations, all feasible precautions must be taken to avoid, and in any event to minimize, incidental damage to the environment. Lack of scientific certainty as to the effects on the environment of certain military operations does not absolve a party to the conflict from taking such precautions. (CIHL Study Rule 44)	IAC IAC; possibly also NIAC	The threshold of “widespread, long-term and severe” is high and thus difficult to satisfy (Tignino 2004, Hulme 2010).
Objects indispensable to the survival of the civilian population	As above. (API Art. 54; APII Art. 14; CIHL Study Rule 54)	IAC/NIAC	The rule specifically protects drinking water installations and supplies and irrigation works. The list of civilian objects in this rule is not exhaustive.
Poisoning of wells	It is especially prohibited to employ poison or poisoned arms. (Hague Regulations 1899 Art. 23; Hague Regulations 1907 Art. 23(a); CIHL Study Rule 72)	IAC/NIAC	This prohibition has been expanded to apply to the natural environment and freshwater sources (Zemmali 1995; Mishra 2007).
Property	It is especially forbidden to destroy or seize the enemy’s property, unless such destruction or seizure be imperatively demanded by the necessities of war. (Hague Regulations 1907 Art. 23(g); CIHL Study Rule 50) Privately owned water wells or pumps must be respected and cannot be confiscated. (Hague Regulations 1907 Art. 46)	IAC/NIAC IAC/NIAC	The Hague Regulations distinguish between private and public property. In some cases, water sources may be private property but in other cases they constitute public property. Transboundary rivers, lakes and aquifers are not usually privately owned (Tignino 2010: 663).
Property in occupied territories	Any destruction by the Occupying Power of real or personal property belonging individually or collectively to private persons, or to the State, or to other public authorities, or to social or co-operative organizations, is prohibited, except where such destruction is rendered absolutely necessary by military operations. (GCIV Art. 53; CIHL Study Rule 51)	IAC	The rule applies to both private and public property.

Starvation	Starvation of civilians as a method of warfare is prohibited. (API Art. 54(1); APII Art. 14; CIHL Study Rule 53)	IAC/NIAC	Starvation is taken to include water as well as food.
ADDITIONAL OBLIGATIONS RELATING TO FOOD			
Objects indispensable to the survival of the civilian population	As above. (API Art. 54; APII Art. 14; CIHL Study Rule 54)	IAC/NIAC	The list of civilian objects in this rule is not exhaustive.
Occupied territories	To the fullest extent of the means available to it, the Occupying Power has the duty of ensuring the food and medical supplies of the population; it should, in particular, bring in the necessary foodstuffs, medical stores and other articles if the resources of the occupied territory are inadequate. (GCIV Art. 55(1))	IAC	
Starvation	Starvation of civilians as a method of warfare is prohibited. (API Art. 54(1); APII Art. 14; CIHL Study Rule 53)	IAC/NIAC	
ADDITIONAL OBLIGATIONS RELATING TO ELECTRICITY SERVICES			
Nuclear electrical generating stations	Works or installations containing dangerous forces, namely dams, dykes and nuclear electrical generating stations, shall not be made the object of attack, even where these objects are military objectives, if such attack may cause the release of dangerous forces and consequent severe losses among the civilian population. (API Art. 56; APII Art. 15)	IAC/NIAC	The notion of “severe losses among the civilian population” is not defined.
	Particular care must be taken if works and installations containing dangerous forces, namely dams, dykes and nuclear electrical generating stations, and other installations located at or in their vicinity are attacked, in order to avoid the release of dangerous forces and consequent severe losses among the civilian population. (CIHL Study Rule 42)	IAC/NIAC	

Table D2. Protection of essential services under international criminal law

War crimes in the Rome Statute (RS) and customary international humanitarian law (CIHL)		IAC	NIAC
Civilian objects	Intentionally directing attacks against civilian objects	RS Art. 8(2)(b)(ii)	CIHL Study Rule 156
Environment	Intentionally launching an attack in the knowledge that such attack will cause widespread, (...) long-term and severe damage to the natural environment which would be clearly excessive in relation to the concrete and direct overall military advantage anticipated	RS Art. 8(2)(b)(iv)	
Health services	Intentionally directing attacks against buildings, material, medical units and transport, and personnel using the distinctive emblems of the Geneva Conventions in conformity with international law	RS Art. 8(2)(b)(xxiv)	RS Art. 8(2)(e)(ii) CIHL Study Rule 156
Objects indispensable to the survival of the civilian population	Intentionally using starvation of civilians as a method of warfare by depriving them of objects indispensable to their survival	RS Art. 8(2)(b)(xxv)	CIHL Study Rule 156
Poisoning of water sources	Employing poison or poisoned weapons	RS Art. 8(2)(b)(xvii)	RS Amended article 8(2)(e)(xiii)
Property	Extensive destruction and appropriation of property, not justified by military necessity and carried out unlawfully and wantonly Destroying or seizing the enemy's property unless such destruction or seizure be imperatively demanded by the necessities of war Pillaging a town or place, even when taken by assault	RS Art. 8(2)(a)(iv) RS Art. 8(2)(b)(xiii) RS Art. 8(2)(b)(xvi)	RS Art. 8(2)(e)(xii) CIHL Study Rule 156 RS Art. 8(2)(e)(v) CIHL Study Rule 156
Proportionality	Intentionally launching an attack in the knowledge that such attack will cause incidental loss of life or injury to civilians (...) which would be clearly excessive in relation to the concrete and direct overall military advantage anticipated	RS Art. 8(2)(b)(iv)	CIHL Study Rule 156

Table D3. Protection of essential services under other bodies of international law

Legal regime	Legal instrument	Interpretation
International human rights law	<i>International Covenant on Economic, Social and Cultural Rights</i> (ICESCR) - Right to an adequate standard of living, including adequate food, clothing and housing (Art. 11) - Right to the highest attainable standard of physical and mental health (Art. 12) <i>General Comment 15</i> of the Committee on Economic, Social and Cultural Rights (CESCR) finds that States are obliged to refrain from “limiting access to, or destroying, water services and infrastructure as a punitive measure during armed conflicts in violation of international humanitarian law.”	The protection offered by IHRL does not cease during armed conflict (<i>Legal Consequences of the Construction of a Wall in the Occupied Palestinian Territory</i>, ICJ Advisory Opinion). The obligation of States regarding economic, social and cultural rights is one of progressive realization. The matter of extra-territorial application of IHRL has not been fully settled (Lubell 2005).
International water law	<i>United Nations Watercourses Convention</i> International watercourses and related installations (...) shall enjoy the protection accorded by the principles and rules of international law applicable in international and non-international armed conflict and shall not be used in violation of those principles and rules. (Art. 29)	This article does not explain the relationship between the Convention and IHL clearly (Tignino 2004; Mishra 2007). During armed conflict, the rules and principles of <i>ius in bello</i> apply unaltered by the Convention, and “the obligation of watercourse States to protect and use international watercourses and related works in accordance with the [Articles of the United Nations Watercourses Convention] remains in effect during [armed conflict].”³

³ International Law Commission, *Report of the International Law Commission to the General Assembly on the work of its Forty-Sixth Session*, Vol. II, Commentary on Article 29 (1994).

REFERENCES

- AAWH (1997), *The Impact of the U.S. Embargo on Health & Nutrition in Cuba*, Denial of Food and Medicine, American Association for World Health, Washington D.C.
- Al-Naseri, Heba, *et al.* (2008), *Rehabilitation Under Fire: Health Care in Iraq 2003-7*, Medact.
- AWWA (2001), *M19 Emergency Planning for Water Utility Management*, Fourth Edition, American Water Works Association, Denver, USA.
- Bastable, Andy and Lamb, Jenny (2011), Innovative designs and approaches in sanitation when responding to challenging and complex humanitarian contexts in urban areas, *Waterlines* 31(1&2), pp. 67-82.
- Bastable, Andy and Russell, Lucy (2013), *Gap Analysis in Emergency Water, Sanitation and Hygiene Promotion*, Humanitarian Innovation Fund, London.
- BMZ (2013), *Strategy on Transitional Development Assistance*, Strategy Paper 6, Federal Ministry for Economic Cooperation and Development, Bonn, Germany.
- Bossuyt, Marc (2000), *The adverse consequences of economic sanctions on the enjoyment of human rights*, UNHCR.
- Brown, Joe, *et al.* (2013), Water, sanitation, and hygiene in emergencies: summary review and recommendations for further research, *Waterlines* 31(1&2), pp. 11-27.
- Bryant, John and Campbell, Leah (2014), *Urban WASH in Emergencies*, ALNAP Learning Report, ALNAP and Registered Engineers for Disaster Relief, London.
- Burnham, G. M., Lafta R., and Doocy S. (2009), Doctors leaving 12 tertiary hospitals in Iraq, 2004-2007, *Soc Sci Med* 69(2), pp. 172-7, <http://www.ncbi.nlm.nih.gov/pubmed/19501443>.
- Butala, Neel M., Michael J. VanRooyen and Ronak Bhailal Patel (2010), Improved health outcomes in urban slums through infrastructure upgrading, *Social Science & Medicine* 71, pp. 935-940.
- CDCP-AWWA (2012), *Emergency water supply planning guide for hospitals and health care facilities*, Centers for Disease Control and Prevention and American Water Works Association, for US Department of Health and Human Services, Atlanta, USA.
- COHRE (2008), *Hostage to Politics: The impact of sanctions and the blockade on the human right to water and sanitation in Gaza*, The Centre on Housing Rights and Evictions, Geneva.
- Davis, Jan, and Lambert, Robert (2002), *Engineering in Emergencies – A Practical Guide for Relief Workers*, Intermediate Technologies Development Group, London, UK.
- Davis, Paul K. (2003), *Besieged: 100 Great Sieges from Jericho to Sarajevo*, Oxford University Press, Oxford, UK.
- Dewachi, Omar, *et al.* (2014), Changing therapeutic geographies of the Iraqi and Syrian wars, *The Lancet* 383(9915), pp. 449-457.
- Duffield, Mark (1994), Complex Emergencies and the Crisis of Developmentalism, *IDS Bulletin* 25(4).

- Farooq, Sabya, et al. (2003), *Continuing Collateral Damage: The Health and Environmental Costs of War on Iraq 2003*, Medact.
- Ghobarah, Hazem Adam, Paul Huth and Bruce Russett (2003), Civil Wars Kill and Maim People –Long After the Shooting Stops, *American Political Science Review* 97(2), pp. 189-202.
- Gordon, J. (2010), *Invisible war: the United States and the Iraq sanctions*, Harvard University Press, Harvard, USA.
- Henckaerts, J.-M., and Doswald-Beck, L., *Customary International Humanitarian Law*, Volume I, Cambridge University Press, Cambridge, 2005 (CIHL Study).
- Hoskins, Eric, and Nutt, Samantha (1997), *The Humanitarian Impacts of Economic Sanctions on Burundi*, Thomas J. Watson Jr. Institute for International Studies, Occasional Paper No. 29.
- Hunter, Paul R., Denis Zmirou-Navier and Philippe Hartemann (2009), Estimating the impact on health of poor reliability of drinking water interventions in developing countries, *Science of the Total Environment* 407, pp. 2621-2624.
- Hunter, Paul R., MacDonald, Alan M., and Carter, Richard C. (2010), Water Supply and Health, *PLOS ONE* 7(11).
- ICRC (1999), *Iraq: 1989-1999, A Decade of Sanctions*, International Committee of the Red Cross, Geneva.
- ICRC (2011), *Health Care in Danger: Making the Case*, International Committee of the Red Cross, Geneva.
- ICRC (2015a), *Explosive Weapons in Populated Areas: Humanitarian, Legal, Technical and Military Aspects*, Report on Expert Meeting, Chavannes-de-Bogis, 24-25 February 2015, Geneva, June 2015, <https://www.icrc.org/en/document/explosive-weapons-populated-areas-humanitarian-legal-technical-and-military-aspects>.
- ICRC (2015b), *Strengthening compliance with international humanitarian law: The work of the ICRC and the Swiss government*, Geneva, 1 May 2015, <https://www.icrc.org/en/document/strengthening-compliance-international-humanitarian-law-ihl-work-icrc-and-swiss-government>.
- International Federation of Red Cross and Red Crescent Societies (2012a), *Risks in Urban Contexts: Conceptual Framework*, International Federation of Red Cross and Red Crescent Societies with the Norwegian Red Cross, Geneva.
- International Federation of Red Cross and Red Crescent Societies (2012b), *The road to resilience: Bridging relief and development for a more sustainable future*, International Federation of Red Cross and Red Crescent Societies, Geneva.
- JHS (2008), *Water, sanitation and hygiene in emergencies*, Public health guide for emergencies, Johns Hopkins Society and International Federation of Red Cross and Red Crescent Societies, Geneva.
- Joyner, Christopher C. (2003), United Nations Sanctions after Iraq: Looking Back to See Ahead, *Chicago Journal of International Law* 4(2), pp. 329-354.
- Keen, David (2007), *Complex Emergencies*, Polity, Bristol, UK.
- Lucchi, Elena (2013), *Humanitarian Interventions in Situations of Urban Violence*, ALNAP Lessons Paper, Active Learning Network for Accountability and Performance / Overseas Development Institute, London.

- Macrae, Joanna (2002), *The new humanitarianisms: a review of trends in global humanitarian action*, HPG Report, Overseas Development Institute, London.
- McElhinney, Helen (2014), The evolution of DFID's humanitarian financing in Yemen, *Humanitarian Exchange Magazine*, Issue 61, May 2014, Humanitarian Practice Network, London.
- Mosel, Irina, and Levine, Simon (2014), *Remaking the case for linking relief, rehabilitation and development*, HPG Commissioned Report, Humanitarian Policy Group, Overseas Development Institute, London.
- Olsen, Gorm Rye, Carstensen Nils, and Høyen, Kristian (2003), Humanitarian Crises: What Determines the Level of Emergency Assistance? Media Coverage, Donor Interests and the Aid Business, *Disasters* 27(2), pp. 109-126.
- Panch, Trishan, et al. (2004), *Enduring Effects of War: Health in Iraq 2004*, Medact.
- Patel, Ronak B., and Burke, Thomas F. (2012), Urbanization—An Emerging Humanitarian Disaster, *The New England Journal of Medicine* 361(8), pp. 741-742.
- Pelling, Mark (2003), *The Vulnerability of Cities: Natural Disasters and Social Resilience*, Earthscan, London.
- Pinera, Jean-Francois (2011), *Cities, Water and War: Looking at how water utilities and aid agencies collaborate in cities affected by armed conflicts*, LAP LAMBERT Academic Publishing, Loughborough, UK.
- PTFP (2012), *List of Restricted Dual-use Goods to the West Bank and Gaza*, Palestinian Trade Facilitation Portal – website hosted by Palestinian Trade Center, Palestinian Shippers Council, Palestinian Federation of Industries, <http://www.ptfp.ps/etemplate.php?id=157>.
- Pushak, Nataliya and Vivien Foster (2011), *Sierra Leone's Infrastructure: A Continental Perspective*, Policy Research Working Paper, World Bank.
- PWA (2011), *The Final Report* (Report 6 of the CSO-G), The Gaza Emergency Technical Assistance Programme (GETAP) on Water Supply to the Gaza Strip: Component 1 – The Comparative Study of Options for an Additional Supply of Water for the Gaza Strip (CSO-G), Palestinian Water Authority, Ramallah.
- Ramalingam, Ben, and Knox-Clarke, Paul (2012), *Meeting the Urban Challenge: Adapting Humanitarian Efforts to an Urban World*, Active Learning Network for Accountability and Performance / Overseas Development Institute, London.
- RedR (2013), *Ready to Respond: Addressing gaps in Urban Technical Skills*, Registered Engineers for Disaster Relief, London.
- Risebro, H.L., et al. (eds) (2012), *Contaminated Small Drinking Water Supplies and Risk of Infectious Intestinal Disease: A Prospective Cohort Study*, Special Issue of PLoS ONE.
- Roberts, L. (2000), The Achilles Heel of Modern Water Systems, *War and Water*, International Committee of the Red Cross, Geneva.
- Rouhani, Shada A., et al. (2012), Urbanization and Humanitarian Access Working Group: A Blueprint for the Development of Prevention and Preparedness Indicators for Urban Humanitarian Crises, *Prehospital and Disaster Medicine* FirstView, pp. 1-4.
- Rubenstein, Leonard S., and Bittle, Melanie D. (2010), Responsibility for protection of medical workers and facilities in armed conflict, *The Lancet*, p. 375.

- Rubenstein, Leonard S. (2012), *Protection of Health Care in Armed and Civil Conflict: Opportunities for Breakthroughs*, Center for Strategic and International Studies, Washington D.C.
- Salvage, Jane (2002), *Collateral Damage: the health and environmental costs of war on Iraq*, Medact, Washington D.C.
- Sanderson, David, Knox-Clarke, Paul, and Campbell, Leah (2012), *Responding to Urban Disasters: Learning from Previous Relief and Recovery Operations*. ALNAP Lessons Paper, Active Learning Network for Accountability and Performance and Overseas Development Institute, London.
- Satterthwaite, David (2013), The political underpinnings of cities' accumulated resilience to climate change, *Environment and Urbanization* 25(2) pp.381-391.
- Smillie, Ian, and Minear, Larry (2003), *The Quality of Money: Donor Behavior in Humanitarian Financing*, Tufts University, Somerville (MA), USA.
- Stoddard, Abby, Harmer, Adele, and Renouf, Jean S. (2010), *Once Removed: Lessons and challenges in remote management of humanitarian operations for insecure areas*, Report prepared by Humanitarian Outcomes for the Center on International Cooperation under a project supported by the Government of Australia.
- Taylor, Glyn, et al. (2012), *The State of the Humanitarian System*, The State of the System, ALNAP, London.
- The Standard (2012), Special Edition: Sanctions, *Standard Bulletin*, August 2012.
- UNICEF (2015), News note: Millions of children in Syria at high risk of disease amid water scarcity and summer heat, UNICEF, Damascus, 10 July 2015, http://www.unicef.org/media/media_82509.html.
- UN-HABITAT (2009), *Urban Indicators Guidelines*, United Nations Human Settlements Programme.
- UNEP (2003), *Afghanistan: Post-Conflict Environmental Assessment*, United Nations Environment Programme, Nairobi, Kenya.
- UNEP (2007), *Lebanon: Post-Conflict Environmental Assessment*, United Nations Environment Programme, Nairobi, Kenya.
- US Army (2008), *Intelligence Support to Urban Operations*, Field Manual FM 2-91.4, Headquarters, Department of the Army. US Army Intelligence Center and School, for the US Training and Doctrine Command.
- US DIA (1991), *Iraq Water Treatment Vulnerabilities*, 5111rept.91, US Defense Intelligence Agency, to CENTCOM, Washington D.C.
- Walker, Peter and Pepper, Kevin (2007), *Follow the Money: A Reveiw and Analysis of the State of Humanitarian Funding*, Feinstein International Center, Medford (MA), USA.
- WHO (2013a), WHO warns of increased risk of disease epidemics in Syria and in neighbouring countries as summer approaches, <http://reliefweb.int/report/syrian-arab-republic/who-warns-increased-risk-disease-epidemics-syria-and-neighbouring> .
- WHO (2013b), Donor update: The Syrian Arab Republic, 9 April 2013, http://www.who.int/hac/donorinfo/syrian_arab_republic_donorupdate9april2013.pdf?ua=1.
- Wild, Leni, et al. (2015), *Adapting development: Improving services to the poor*, Overseas Development Institute, London.

Willitts-King, Barnaby, Mowjee, Tasneem, and Barham, Jane (2007), *Evaluation of Common/Pooled Humanitarian Funds in DRC and Sudan*, UN Office for the Coordination of Humanitarian Affairs.

Zeitoun, Mark, Eid-Sabbagh, Karim, and Loveless, Jeremy, (2014), The analytical framework of water and armed conflict: a focus on the 2006 Summer War between Israel and Lebanon, *Disasters*, Vol. 38, Issue 1, pp. 22-44.

MISSION

The International Committee of the Red Cross (ICRC) is an impartial, neutral and independent organization whose exclusively humanitarian mission is to protect the lives and dignity of victims of armed conflict and other situations of violence and to provide them with assistance. The ICRC also endeavours to prevent suffering by promoting and strengthening humanitarian law and universal humanitarian principles. Established in 1863, the ICRC is at the origin of the Geneva Conventions and the International Red Cross and Red Crescent Movement. It directs and coordinates the international activities conducted by the Movement in armed conflicts and other situations of violence.

