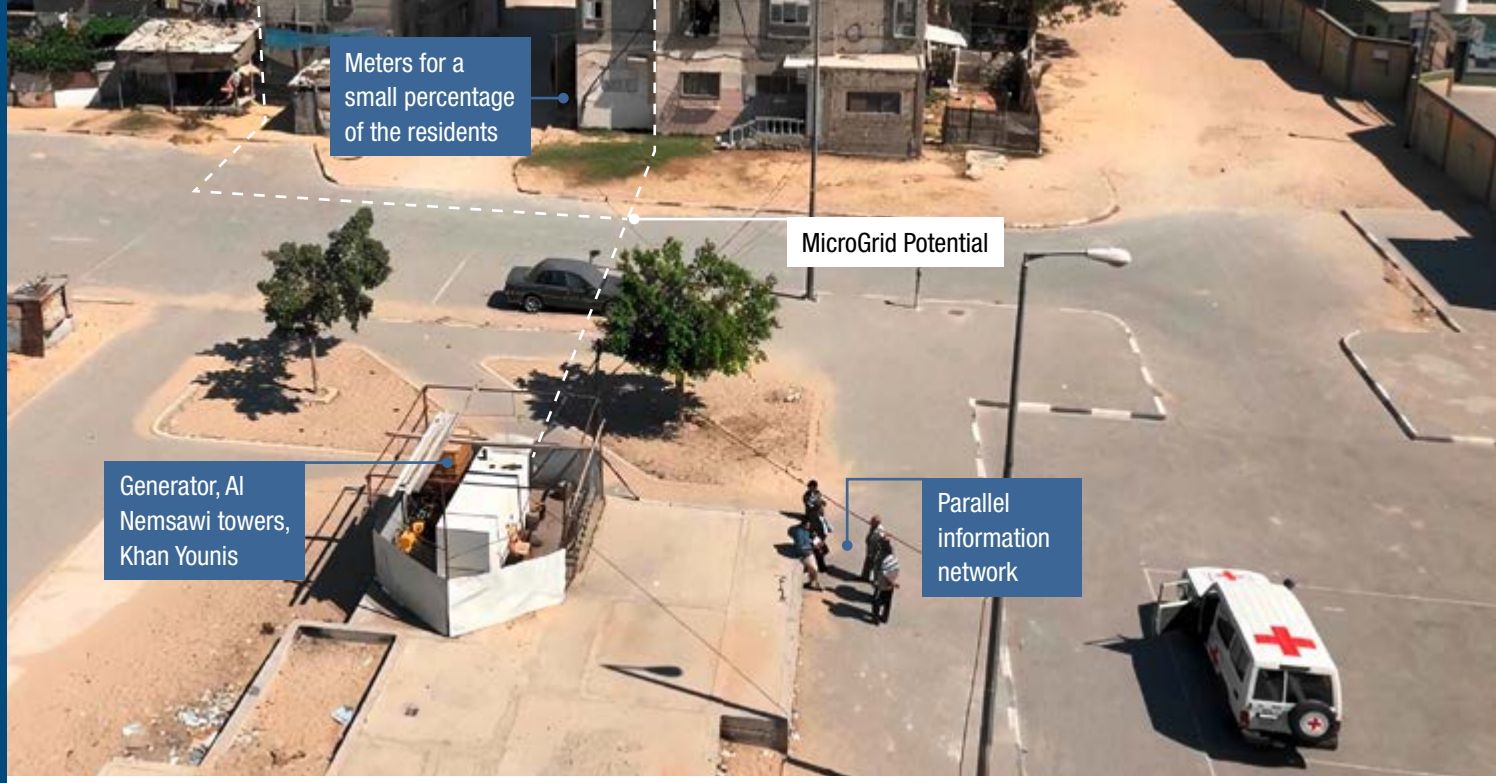

TOWARDS MORE EFFECTIVE HUMANITARIAN OPERATIONS IN URBAN AREAS OF PROTRACTED ARMED CONFLICTS

LESSONS LEARNED FROM APPLYING OPERATIONAL RESILIENCE AND INSTITUTIONAL LEARNING IN GAZA

REFERENCE

ICRC

Cover photo: Elaboration showing the process of creating opportunities for new type of projects.

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CONTENTS

PREFACE

Since at least the late 1980s, the humanitarian sector has been aware of how conflicts underpin complex emergencies. With their many intersecting causes and roots in countries and regions affected by such crises, conflicts erode and damage the political, economic and social fabric of the societies within which they emerge.

The humanitarian response to this complexity has not been easy or straightforward. This is in part because aid itself becomes caught up in – and a target of – violence and appropriation. At the same time, however, humanitarian aid has been built on the idea of delivering simple solutions to known problems, and the resulting policies and programmes are often characterized by reductionist and linear assumptions. If one were to summarize, this is based on the underlying principle that crises are based on gaps or needs, and the humanitarian endeavour should focus on filling those gaps and meeting those needs as quickly as possible for as long as funding is available.

The failures of this way of working do not need repetition here. Frustration with the associated methods, mindsets and modalities has been growing, and researchers, practitioners and policymakers have been calling for novel ways of thinking about and providing assistance in complex and volatile settings. The hope is that new kinds of interventions – more systemic in their outlook, more sensitive and attuned to complex realities, and more adaptive in the face of changing and uncertain situations – might lead to greater humanitarian results and impacts.

This publication summarizes one such initiative developed by the ICRC's Water and Habitat (WatHab) Unit as a way of enhancing operational resilience in the protracted and urban armed conflict of Gaza. The effort has focused on how best to ensure reliable provision of essential services in the face of the highly restrictive blockade and the ongoing escalation of the conflict. As the report ahead attests, it has been a noteworthy endeavour. To my mind, this is on at least three counts.

First of all, the initiative seeks to identify a range of technical delivery areas where systems thinking can add value to operational resilience. In doing so, the WatHab Unit has been able to move away from academic abstractions common to much systems thinking and towards very clearly articulated areas where tangible practices can be changed and adapted at the front line of humanitarian responses. The team members learn about water systems, energy supplies and other critical infrastructure through a systems lens. They are encouraged to see their efforts not as simple fixes, but rather as an additional variable in complex and contested arenas in which the ICRC intervenes, using a principled and humble approach.

Second, there is a clear commitment to move beyond the methodological monoculture that has characterized much humanitarian aid, and to explore new methods and tools that could add value to our thinking and practice, The annexes in particular are a treasure of methods, ideas and approaches that can help all of us wanting to engage in complexity in more rigorous ways.

Finally, there is no shying away from the political challenges and the roots of the underlying conflict. This requires a transparent and honest focus on what the ICRC and the wider humanitarian community can and cannot do in such protracted contexts, with interventions designed accordingly. The transparent, robust but respectful way in which the limits and possibilities of aid are outlined – and the transformative potential of learning is described – is something that the sector as a whole could and should take to heart.

Let me hope that the ideas and insights contained here are shared widely across the ICRC, discussed, debated and absorbed, and ultimately factored into the organization's approach to complex humanitarian crises.

Ben Ramalingam
Executive Director
UK Humanitarian Innovation Hub

EXECUTIVE SUMMARY

This report documents a process that the International Committee of the Red Cross (ICRC) is developing to achieve more effective operations in cases of protracted urban armed conflict.

The duration of these conflicts challenges the sustainability of traditional short-term programming and funding cycles and calls for a more strategic and longer-term vision.

The ICRC's offices in Gaza and Geneva have risen to this challenge over the past several years by implementing projects aimed at improving the operational resilience of basic service providers. These projects have also been incorporated into the ongoing five-year Gaza Resilience Programme (GRP).

Drawing on institutional learning theory and an analysis of the people and documents at the heart of this process from 2014 to 2020,* the ICRC has also prepared this report, which presents the protracted conflict operations cycle as a method whose principles may benefit people in similar situations.

This report argues that all humanitarian actors keen to address the challenges of protracted armed conflicts more effectively must understand the situation in question thoroughly by investing extensively in data collection to improve the evidence base; design operations with operational resilience in mind, as such operations are likely to involve and benefit more people in the longer-term; and learn from the original design and actual execution of operations, so that self-improvement becomes a constant feature.

This report also describes several steps that ICRC headquarters and country delegations can take along this path, including developing and nurturing a culture of learning across the organization.

* The documentation and analysis used for this report predate the May 2020 hostilities in Gaza.

INTRODUCTION

Many of today's armed conflicts are fought in urban areas and are increasingly becoming protracted. The average time that the ICRC has been present in its ten largest operations is 42 years. These protracted urban crises have caused unprecedented humanitarian needs that pose unique challenges with devastating consequences for public health, displacement and livelihoods.

Currently, some 50 million people worldwide are affected by armed conflict in urban areas and an additional 80 million people are displaced with over 25 million of them being refugees, many of whom reside in urban host communities rather than camps. On top of this, access to water services are the lowest in fragile countries, which achieved roughly half the rate of progress that non-fragile countries made toward the Millennium Development Goals (MDGs).

And yet still too few humanitarian actors have adapted their approach to provide service providers with the support they require to:

1. strengthen the resilience of essential services to avoid a collapse
2. ensure at least a minimum level of service delivery required to maintain the associated public health risks at low and
3. continue to enable an emergency response is available – water trucking and evacuating sewage from built up areas – when needed.

Humanitarian organizations are well versed in directing their assistance towards the most vulnerable, but less equipped to take more of an area-based approach that factors in the entire population at risk. Targeting the most vulnerable for humanitarian assistance programming is no longer enough on its own, since the entire urban population could be at risk, if essential service systems fail. Urban areas can accommodate large numbers of people, which are often more dependent on essential services than their rural compatriots, in turn rendering them more vulnerable to service disruptions. For these reasons, humanitarian support to water supply and sanitation (WSS) service providers has increasingly become a necessity in urban areas.

However, urban services are inherently complex and highly interconnected and therefore humanitarian actors need to adapt their approach and develop the capacity and capabilities to be able to provide effective support to service providers whose role is to operate and maintain these essential service systems.

The dependencies between services need to be factored into humanitarian interventions that seek to ensure continuity in the delivery of water and wastewater services, such as their reliance on these services have on electricity supply. Water, sanitation and electricity are lifeline services for hospitals, schools and other critical infrastructure services. The interdependencies between urban services make them vulnerable and the risks associated with failure are high. For instance, if one infrastructural installation fails then an entire service can be disrupted as well as other associated services that enable their delivery to hundreds of thousands if not millions of people. With the foreseeable risk of widespread humanitarian consequences in urban areas of protracted crises, comes the responsibility to act preventatively to mitigate the full brunt of the consequences and in doing so, allow for the emergency response to more effectively address the residual needs.

To better address urban needs in a more holistic manner overtime, requires different and adapted humanitarian approaches and tools that bridge emergency response with longer-term preventative support to service providers.

ICRC operations have been evolving to meet these challenges and one exemplary case of where the organization has gone well outside of 'business as usual' is in the Gaza Strip. The ICRC has focused on developing a better understanding of how different segments of the population of the Gaza Strip are affected by different crises and how best to mitigate the impact on the most vulnerable, while still ensuring access to services for the population at large. The GRP seeks to strengthen the resilience of essential services in order to ensure their continuity and in doing so deliberately contribute to the prevention of a deterioration in Water, Sanitation and Hygiene (WASH) conditions and health outcomes.

As important as it is to learn from the implementation of humanitarian assistance programmes and projects, the institutional experience of going through a process of change provides an opportunity for institutional learning that holds the potential to inform the development of more fit-for-purpose urban programming elsewhere.

It is our sincere hope that the ICRC's lessons learned from applying operational resilience and institutional learning in Gaza, as documented in this report, will contribute to the process of learning of other humanitarian stakeholders and ultimately help improve urban programming to better meet the needs of the affected population.

Michael Talhami
Urban Services Advisor
ICRC

Khan Yunis Wastewater Treatment Plant, Gaza; maintained with the support of ICRC

J. Cameira/ICRC

1. RISING TO THE CHALLENGE

1.1 OBJECTIVE

This report documents and presents a process that the ICRC is developing, based on an operational practice that was implemented in 2016,[1] to improve its humanitarian operations in protracted urban armed conflicts. The objective is to bridge the perceived gap between emergency and development situations while reinforcing emergency preparedness and response capacity.

This gap loses all practical significance when a conflict is drawn out, yet many humanitarian and development actors continue to choose sides. The ICRC defines protracted armed conflicts as intractable, mutable and long.[2] When they occur in urban centres, they are infinitely more complex because of the numerous social, environmental and biophysical systems that are both interdependent and essential to residents. The challenge in such situations is to develop and execute operations that are at once lifesaving and life-improving. To rise to the challenge, development professionals and organizations should remain active during crises, and humanitarian workers must carry out operations that seek to reduce the complexity over the longer-term[3,4] by delivering more durable solutions. This approach thus has the potential to deliver a more sustainable humanitarian impact.[5]

Based on documented experience in Gaza between 2014 and 2020, humanitarian organizations keen to improve their operations in protracted urban armed conflicts should:

1. **understand the protracted urban armed conflict before they design a response to it.** This means developing an evidence base by investing in data collection and analysis.
2. **design operations with operational resilience in mind.** This means more sustainable and longer-term benefits, while strengthening the capacity for emergency preparedness and response.
3. **learn from the operations' design and execution.** In addition to standard assessment processes, this means questioning the assumptions used and the situation in which the operations developed.

Each of these features is central to the protracted conflict operations cycle, which was inspired by an analysis of the effectiveness of a decade and a half of annual plans in Gaza. This cycle comprises two interrelated phases: the operational resilience approach and what has been learned from following it.

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1 The process started shortly after the 2014 hostilities in Gaza with an internal review of the need to strengthen the resilience of essential services rather than simply build back to how things were before the hostilities. This led to the initiation of a resilience assessment of the interconnected water, wastewater and electricity services in Gaza that now informs ongoing and future operations by the ICRC.

2 ICRC, *Protracted conflict and humanitarian action: some recent ICRC experiences*, ICRC, Geneva, 2016, p. 4.

3 In other words, humanitarian operations in protracted urban armed conflicts should act as development holds – in the sense that they hold off development reversals, possibly leading to modest contributions to the Sustainable Development Goals (SDGs), while still seeking to safeguard public health in times of crisis. See ICRC, *Armed Violence and the New Urban Agenda: The ICRC's recommendations for Habitat III*, ICRC, Geneva, 2016, p. 25.

4 World Bank Group, ICRC and UNICEF, Joining Forces to Combat Protracted Crises: *Humanitarian and Development Support for Water Supply and Sanitation Providers in the Middle East and North Africa*, World Bank Group, ICRC and UNICEF, Washington DC, 2021.

5 Understood to be in accordance with Strategic Orientation 2 ("Building Relevant and Sustainable Humanitarian Impact with People Affected") of the ICRC Institutional *Strategy 2019–2022* (see ICRC, ICRC Strategy 2019–2022, ICRC, Geneva, 2019, p. 14. For the ICRC, a sustainable humanitarian impact means ensuring that people cannot only survive but also live and (re)build their lives with autonomy and dignity, even when conflict and violence persist. Operationally, this means developing tools and approaches to ensure that the ICRC's programmes are relevant to the needs of affected people and strengthens their resilience and that their effects endure and reach a large scale – whether through its own actions or through the actions of others (see ICRC, *Building sustainable humantiarian impact with people affected by protracted conflict and chronic violence – ICRC Policy Paper (working draft)*, 2020, p. 9).

1.2 THE OPERATIONAL RESILIENCE APPROACH

The operational resilience approach refers to a number of design and monitoring processes that the WatHab Unit has developed and continues to develop in order to improve its operations in Gaza and achieve a more sustainable humanitarian impact (as documented in Chapter 3). The concept of resilience is appealing because it focuses on the ways that communities and organizations are able to carry on with their lives through protracted urban armed conflicts. Resilience is understood here as an ability; it is not an operational goal or a goal of the resilience projects that operations have given rise to.[6] It is also often understood to mean the ability to bounce back, or to bend like a reed in the wind, rather than to snap like a twig.

The ICRC defines operational resilience as "the ability of [an] operation to respond to and absorb the effects of shocks and stresses and to recover as rapidly as possible to normal capacity and efficiency".[7] In other words, it refers to the extent to which those responsible for providing a service have developed the ability to cope with and adapt to situations where essential services do not meet their basic needs.

1.3 TOWARDS INSTITUTIONAL LEARNING

Organizations that seek to be relevant in complex situations are advised to do a number of things: establish an effective culture of learning[8] (i.e. in which people are willing to accept change, and where the organization is not afraid to fail); develop and use an effective analytical and design process to leverage the learning culture; and adapt and apply the process for each challenge, within existing institutional constraints.[9]

The most common way an organization can adapt and progress is by applying lessons learned from past experience to future operations (i.e. learning the lessons, and asking "What did we get wrong?" and "How are we going to avoid that this time?"). As shown in Figure 1.1, such single-loop learning is typical of conventional monitoring and evaluation but sheds no light on the root of the issues from which the lessons were learned. The learning can be taken further through the double-loop approach, which queries the causes underlying the lessons (i.e. not "What did we get wrong", but "Why did the lessons have to be learned in the first place?"). In practice, double-loop learning typically means questioning the assumptions that were in place when the action was designed.[10]

6 As Ramalingam states, "the goal is not to be well-adapted, but to [be able to] adapt well", in B. Ramalingam, Aid on the Edge of Chaos, Oxford University Press, Oxford, 2013, p. 326.

7 From the University of Toronto Centre for Resilience of Critical Infrastructure as cited in Southern Harbour, *A Comprehensive Resilience Assessment of the Integrated Essential Services in the Gaza Strip – Part 1: Resilience Assessment*, Southern Harbour, Toronto, 2018 (not published).

8 This corresponds with Objective 2.7 of Strategic Orientation 2 of the ICRC Institutional Strategy 2019–2022, which states: "As a learning organization, the ICRC: strengthens its capacity to evaluate the outcomes of its activities and learn from its successes and failures; embeds evaluation more firmly in its planning and result-based management systems; takes advantage of the increasing availability and collection of relevant data; leverages a variety of evaluation methods, including qualitative and quantitative approaches, with a view to having a greater operational impact and promoting institutional learning", in ICRC, *ICRC Strategy 2019–2022*, p. 17, 2019.

9 Ramalingam, pp. 256, 346, 348 and 350, 2013.

10 C. Agyris, On Organizational Learning, Blackwell, Cambridge, 1999.

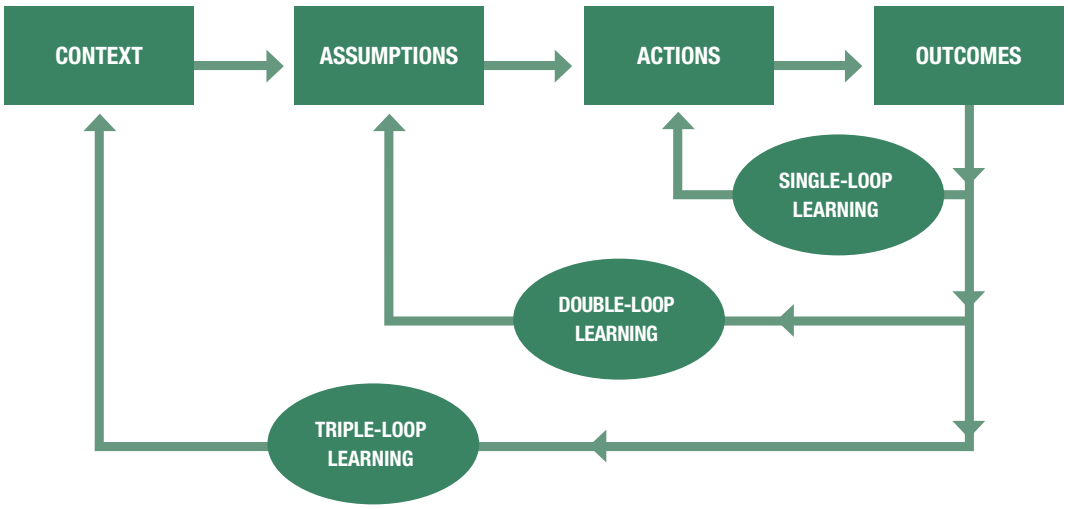

Figure 1.1 Feedback loops through which organizations can learn: single-, double- and triple-loop learning.[11]

Triple-loop learning occurs when an organization examines the circumstances that led to the assumptions that underpinned the actions requiring improvement (i.e. "What is it about our way of thinking that led to the assumptions which were in place?").[12] **Triple-loop learning has been described as learning about learning**, and when acted upon properly, it can ensure that an organization is both very effective in the present and well-prepared for future uncertainties.

The easiest way for an organization to repeat its mistakes is to not close even the first loop. **It follows that the only way an organization can be effective in protracted urban armed conflicts is to engage in at least double-loop, if not triple-loop, learning – no matter how uncomfortable the answers** (see Section 2.3). This is because only honestly critical questioning can lead to the institutional shifts that are required to meet the scale of the challenge: shifts in mindsets, regulations or operational procedures; shifts towards horizon-scanning, away from projects developed on the back of a single field visit or request; shifts from relying on experience and intuition to leveraging sophisticated analysis; **shifts for short-term specialists to also take on long-term thinking (to value lives as well as save them, to prevent rather than just cure, to reach for public health data and electrical inverters along with scalpels and duct tape)**. The adjustment is already under way at the ICRC, which is expanding its "urban expertise",[13] and will continue through the development of a culture of learning.

The protracted conflict operations cycle described in the next chapter is an application of the single-, double- and triple-loop learning process that has been undertaken in Gaza, as discussed in Chapter 3. Chapter 4 suggests steps that can be taken to ensure continued progress towards more effective humanitarian operations in protracted urban armed conflicts.

11 Based on Agyris, 1999; and P. Tosey, M. Visser and M.N. Saunders, "The origins and conceptualizations of 'triple-loop' learning: A critical review", Management Learning, Vol. 43, No. 3, December 2011, pp. 291–307.
12 See discussion in P. Tosey, M. Visser and M.N. Saunders, 2011.
13 ICRC, Protracted conflict and humanitarian action, 2016.

Rafah Wastewater Treatment Plant, Gaza; constructed with support of the ICRC 2008-2010

M. Al-Baba/ICRC

2. THE PROTRACTED CONFLICT OPERATIONS CYCLE

This chapter presents the protracted conflict operations cycle developed to improve humanitarian operations and achieve a more sustainable humanitarian impact in Gaza. The cycle originated in the processes and projects known generally as the operational resilience approach (see Annex C). While the protracted conflict operations cycle is still a work in progress, it is presented in its broadest and current form in Figure 2.1.

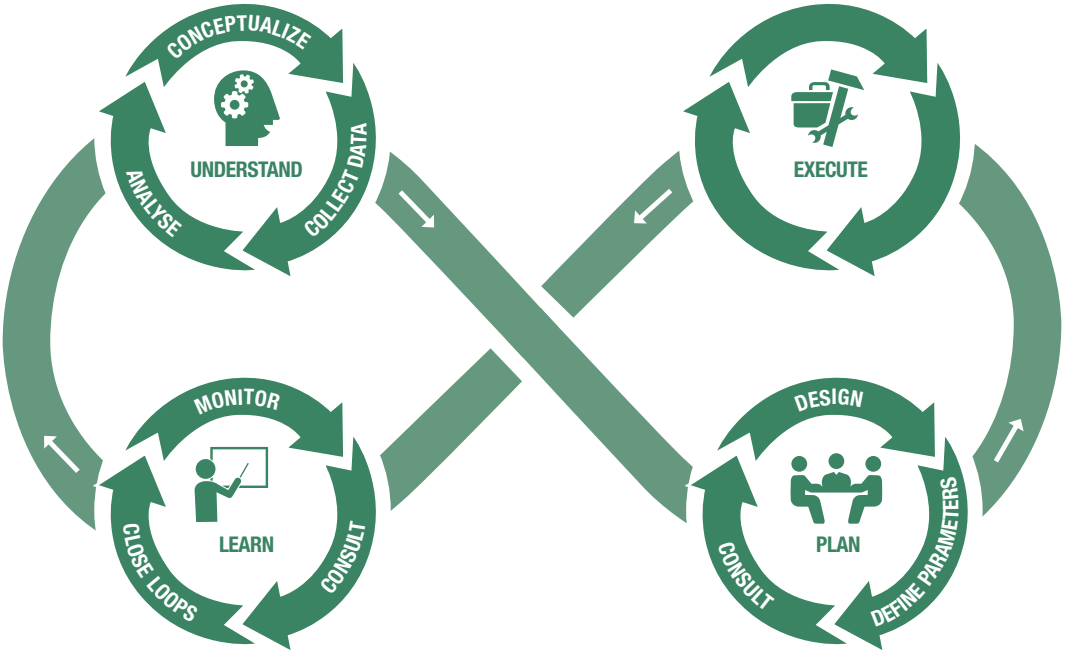

Figure 2.1 The protracted conflict operations cycle, emphasizing the cyclical and repetitive nature of the approach and describing the steps at each stage.

The never-ending path shown in Figure 2.1 emphasizes the centrality of institutional learning in the protracted conflict operations cycle. And, as the guidance in Annex D shows, the process begins with understanding what has been learned, followed by the planning, execution and (further) learning stages.

2.1 UNDERSTANDING

The first stage of the protracted conflict operations cycle involves four steps.

Conceptualization. Because of the never-ending nature of the protracted conflict operations cycle, the conceptualization of a new project will likely be based on the past experience and intuition of the people involved. Such field wisdom is essential for spotting opportunities as they arise or when brainstorming with key partners to scope out the shape and breadth of a future operation. Yet protracted urban armed conflicts are so complex that unchecked assumptions and long-held ideas can be very misleading or completely wrong and must be reviewed at this stage.

The knowledge gathered in Gaza demonstrates the merit of maintaining an open mind when building on one's intuition and experience. Although WatHab engineers were initially reluctant to enquire into how different communities coped with generally poor electricity services, they now credit the *Coping Mechanisms Catalogue* that they developed for inspiring projects that they would not have otherwise considered (such as feeding community-produced electricity into the national grid – see Section 3.4).

It is at this point in the process that the first step away from the typical emergency mindset should be taken, incorporating the medium- and long-term – in addition to the present – into the equation. Central to this conceptualization step is to incorporate what has already been learned from related projects, thus closing the learning loop at the very first opportunity. If the operations manager or designer is fortunate, they will have already been around the loop a few times and concepts like "resilience", "far-sightedness" and "broadly targeted" (see Section 2.2) will inevitably be on their mind.

Analysis I. As the review of resilience projects in Annex D demonstrates, analysis is central to the goal of achieving more effective humanitarian operations and having a more sustainable humanitarian impact. At some point soon after the conceptualization phase, experience and intuition must give way to investigation in order to more accurately define the scope of the operation. The operations team's strengths and weaknesses must be assessed, for instance, to ensure that whatever is conceptualized can actually be implemented. Spotting windows of opportunity and other entry points at this stage may also prove crucial to achieving results much later on. Another key step away from the normal emergency comfort zone that should be taken at this stage is to spot opportunities to work with stakeholders of all types (e.g. in the fields of education, business or health) and with people from across the ICRC. In Gaza this came about following WatHab's initial engagement with the electricity authorities (previous partnerships were only with the water authorities) as well as with the Health and Economic Security (EcoSec) Units. Teams going through the protracted conflict operations cycle are advised to map out all stakeholders based on a deep analysis of their motivations using the most appropriate tools and methods (as reviewed in Sections A2 and C3).

Data collection. Any learning process relies on evidence, whether this is secondary data from existing reports or primary data collected to support the deep level of analysis. As the lessons learned from the Gaza resilience projects show (see Annex D), the evidence should include: any and all data on the mechanisms that people and service providers have developed to cope or adapt; the various types of people affected by armed conflict (see Section C3.4); the various impacts of the conduct of hostilities (CoH); existing plans of old and new partners; and, perhaps most usefully, the links and interdependencies between actors and between sectors. This was provided in Gaza through both internal reports[14] and, when in-house expertise was lacking, through outside support.[15]

Analysis II. At this stage, the analysis required to understand and address the complexity of protracted urban armed conflicts can begin. All of the data collected can be processed through the most appropriate tools. Mind maps of dependent relationships are likely to be necessary (see Figure 2.3), for example, to first brainstorm and then untangle the level and degree of interdependencies, although simpler tools like dependency matrices may be even more effective. Through an inductive and cyclical analytical process, the potential beneficiaries of the operation can be interpreted in view of the risks and hazards (for more detail, refer to the hazard and beneficiary mapping process described below).

14 Internal documents: ICRC, *Catalogue of Coping Mechanisms*, 2018, and ICRC, *Smart Meters Report*, 2020 (see Annex C).

15 Southern Harbour, *A Comprehensive Resilience Assessment*, 2018, and internal document: ICRC, *Health Impact Assessment* scoping study, 2019 (see Annex C).

2.2 PLANNING

The second stage of the protracted conflict operations cycle involves three steps.

Defining parameters. This is the step at which practicalities have to be considered and allowed to shape operations. The maximum available budget is always a key factor, but choices also have to be made about whether to try to fill in data gaps and hire contractors to provide missing expertise, or rather to tailor the operations to get around such shortcomings. The ICRC's experience in Gaza shows that the generation of general and specific objectives for internal planning purposes is best done through an inductive process (i.e. that is based on open-minded and ambitious plans that have been refined in view of field and budgetary constraints).

Design. The lessons-learned exercise following the critical review of the Gaza resilience projects in Annex D identified a number of features that everyone involved in designing operations should follow at this stage. These are referred to in Table 2.1 as "protracted urban armed conflict design characteristics".

DESIGN CHARACTERISTICS	OPERATIONS ARE DESIGNED TO…
Far-sighted	…target *medium- and long-term objectives*, in addition to short-term objectives
Broadly targeted	…target *secondary and tertiary beneficiaries*, in addition to direct beneficiaries
Impact-focused	…address the *indirect and cumulative impact*, in addition to the direct impact
Interdependent	…leverage existing *interdependencies* between sectors and systems
Inclusive	…*maximize the involvement* of communities, local authorities and other ICRC units
Redundant	….ensure *spare capacity* and components are available
Integrated	…*align with existing plans*, decision-making processes and interests
Flexible	…be able to *adopt alternative strategies* to achieve the same objectives under different circumstances

Table 2.1 Protracted urban armed conflict design characteristics (shortlist). These are proposed for uptake by the ICRC during the design step of the planning stage.[16]

16 This table is based on documentation from the resilience projects in Section D1 and the following publications: ICRC, *Urban services during protracted armed conflict: a call for a better approach to assisting affected people*, ICRC, Geneva, 2015; ARUP and the Rockefeller Foundation, *Measuring City Resilience – Research Report Volume 4/6*, ARUP and the Rockefeller Foundation, 2016; E. Houiellebecq, *Urban Resilience in Post-Disaster Recovery: A Case Study on the 2015 Nepal Earthquake*, MA diss., University of Cambridge, 2017; and ICRC, *Israel and the Occupied Territories: Concept note for helping to build people's resilience to the humanitarian conseqences of chronic difficulties in the Gaza Strip*, ICRC, Geneva, 2019.

Even if operations are not being designed specifically to build community or institutional resilience, they are likely to have a more sustainable humanitarian impact if they are flexible and integrated, or if they build in flexibility or redundancies. Operations should also be designed to be as far-sighted (i.e. long-term) and broadly targeted (in terms of the breadth of beneficiaries reached) as possible. The question of being "integrated" proved to be particularly important in Gaza, because the partners' more pressing interests sometimes conflicted with the goals sought by the longer-term approach (a solution was found by aligning the partners' and communities' interests to create win-win-win situations – see Section 3.3 – in order to complete the standard project proposal document). Furthermore, the outcomes should be interpreted as measurables (see the hazard and beneficiary mapping process described below and in Table E1).

Consultation. Engaging with stakeholders is considered a crucial aspect of building resilience, not least because it helps maintain the integrity of the proposed operation. Good faith consultations can ensure the operation addresses actual needs and heightens the stakeholders' sense of ownership. The involvement of stakeholders at the early stages of the process will also ensure that the benefits are better understood by a wider group of beneficiaries, as discussed in the next section. In other words, the greater the buy-in from stakeholders, the more lasting the operation will be.

2.3 LEARNING

Single-loop learning. Most monitoring and evaluation procedures used at the ICRC are based on single-loop learning (i.e. "What did we get wrong?"). This crucial process can be made more effective if it takes into account the innovative ways in which the ICRC documents the impact of its operations in Gaza, as shown in Figure 2.2 (modelled after the hazard mapping and severity assessment procedures that are reviewed in Section C3).

Figure 2.2 Proposed process to determine outcomes of operations so that they may be more easily monitored.

The first step is to identify the hazard that impacts people. A wide variety of impacts was apparent in Gaza, such as the spread of antimicrobial resistance through treated wastewater; the destruction of personal documentation (birth certificates, home ownership deeds, etc.) and its economic consequences; displacement resulting from security measures; and the lack of refrigeration in local fish markets and in the export process (the cold chain).

The next step is to determine the local hazard footprint, i.e. the spatial extent of the direct impact of the hazard. In the case of a failed wastewater pumping station (Annex C), the local hazard footprint was determined through geospatial analysis that mapped out the extent of the resultant flood of wastewater. The local hazard footprint for antimicrobial resistance may be smaller, e.g. limited to the vicinity of the hospital or health-care facility.

The third step is to determine the real hazard footprint, i.e. the broader spatial extent of the impact of the hazard. This footprint is termed "real" because it acknowledges the fact that many people may be affected indirectly, rather than directly, by a hazard. Such is the case in particular if the effects are transmitted upstream or downstream in the framework of a service provided (see Section A1), whether within or beyond the particular system of concern. For example, if the flooding resulting from the failure of the aforementioned pumping station caused a connected pumping station in another neighbourhood to fail, the real hazard footprint would comprise the expected extent of the risk to public health of the failure of both pumping stations. If the failure of the second pumping station caused wastewater near the hospital it serves to back up, the real hazard footprint would include the vicinity of the hospital and the area affected by the flooding emanating from both pumping stations.[17]

The fourth step is to identify the people who could be impacted by the hazard. Here again, the suggestion is to identify all those who are affected by the operation's failure. The scale and extent of the beneficiaries could be qualified by hazard footprints. People impacted within the local hazard footprint would be considered direct beneficiaries. People impacted within the extended real hazard footprint, but also within the same system (i.e. wastewater or health), would be considered secondary beneficiaries. People impacted within the extended real hazard footprint yet beyond the system under consideration (i.e. at the hospital, in the case of the failed wastewater pumping station) would be considered tertiary beneficiaries.

Because not all impacts are the same, the final step is to characterize the degree of expected impact. This could be done through a simple method that pegs each type of beneficiary to the severity of impact (low, medium, high) and its duration (short- and long-term), as in Table C.2.

Second-loop learning. This is the point at which everyone involved in an operation should take a step back and question what they have just achieved. The learning loop should be closed at this point by interrogating the initial assumptions used to understand the challenge and design the response. This can be done by digging up the documentation used during the conceptualization and analysis steps of the first stage (Understanding) of the protracted conflict operations cycle.

Operations that are analysed to this extent could well be run better the next time around. But the people who pose the questions must be ready to accept some uncomfortable answers. For example, while the temporary wastewater treatment plants constructed by WatHab in Gaza in 2015 have reduced several public health risks, there may be reason to believe, six years later, that they also spread antimicrobial resistance back to the community. Although this has yet to be confirmed, the possibility of a project having unexpected harm is crucial knowledge that needs to be internalized and learned from. Such knowledge of the unintended consequences would not have come about, however, without two features: the implementation of the 2019 Health Impact Assessment (HIA) scoping study that was carried out during the 'Understanding' phase of the protracted conflict

17 In the case of the spread of antimicrobial resistance, the real hazard footprint might extend beyond the health-care facility to its own wastewater cesspit. If the antimicrobial resistance were found to originate in chicken farms (due to heavy antibiotic use, for example), the real hazard footprint would extend upstream to include the spatial area of the chicken farm, the health-care facility, and its wastewater cesspit.

operations cycle, and the questioning of assumptions about the ICRC's level of knowledge about the public health situation in Gaza (which led to the HIA scoping study being commissioned in the first place). By pointing out the flaws in an operation, the protracted conflict operations cycle encourages the development of ways to address them, and possibly the development of a whole new operation. In the example above, it led the ICRC to the cutting edge of war zone epidemiology,[18] with considerable implications for the ICRC's Protection and Legal Divisions, as described below.

It is worth repeating here that such knowledge would not have been captured through the standard ICRC monitoring forms and procedures. Without a willingness to ask questions, past mistakes and missteps would be repeated, precisely because few people would really even be aware of them. Any organization keen on advancing in this way must create the space for its employees to both question their assumptions and feel comfortable about sharing any lessons learned.

Triple-loop learning. There is yet more learning to be done once a project has been evaluated and assumptions have been checked. This is where the context that generated the assumptions is queried in an attempt to determine the extent to which it is responsible for any lessons that had to be learned. In the case of the temporary wastewater treatment plant discussed above, triple-loop learning would question why the ICRC's level of knowledge of public health in Gaza was limited. The answer may be found in what several interviewees identified as the ICRC's culture of short-termism and working in silos (see Section C4). The point is not to denigrate the level of knowledge or commitment of ICRC staff – only a handful of people around the world are currently concerned about the spread of antimicrobial resistance through wastewater. But examining how projects that work well in some situations do not fit the one at hand draws attention to structural issues within the organization. Thus, triple-loop learning brings the same focus to a tiny wastewater plant of a subdelegation's WatHab team and the human resources structure established in Geneva over a century ago.

Another example of triple-loop learning – and of the tools that can be used to encourage it – comes from the conundrums that led to the development of the protracted conflict operations cycle in the first place. As discussed in Section C2, one of these was a version of the long-standing dilemma of external assistance: how heavy reliance on outside donor support in Gaza gives the illusion of stability yet creates vulnerability. The answer was found through the extensive mapping of dependent relationships (shown in all its complexity in Figure 2.3). The diagram revealed issues as diverse as the disabling effect of victim mentality, the very little awareness of how people coped, and the benefits of geo-referenced epidemiological studies.

In revealing such relationships, the triple-loop learning underpinning the diagram also points out the path to address each issue. The question of victim mentality was addressed obliquely by the smart meter and community electrification projects (Annex C); the gap in knowledge of how people cope was plugged by the *Coping Mechanisms Catalogue*; and the benefits of the geo-referenced epidemiological study are being reaped through the HIA scoping study.

As with double-loop learning, this type of learning about learning must be facilitated by managers who can provide the required institutional space and time to question without fear of recrimination. This activity may also be helped by concepts and applications designed to assist (see Section A3).

18 For more on sewage surveillance, see P. Vikesland, "Differential Drivers of Antimicrobial Resistance across the World", Acc Chem Res, Vol. 52, No. 4, March 2019, pp. 916–924.

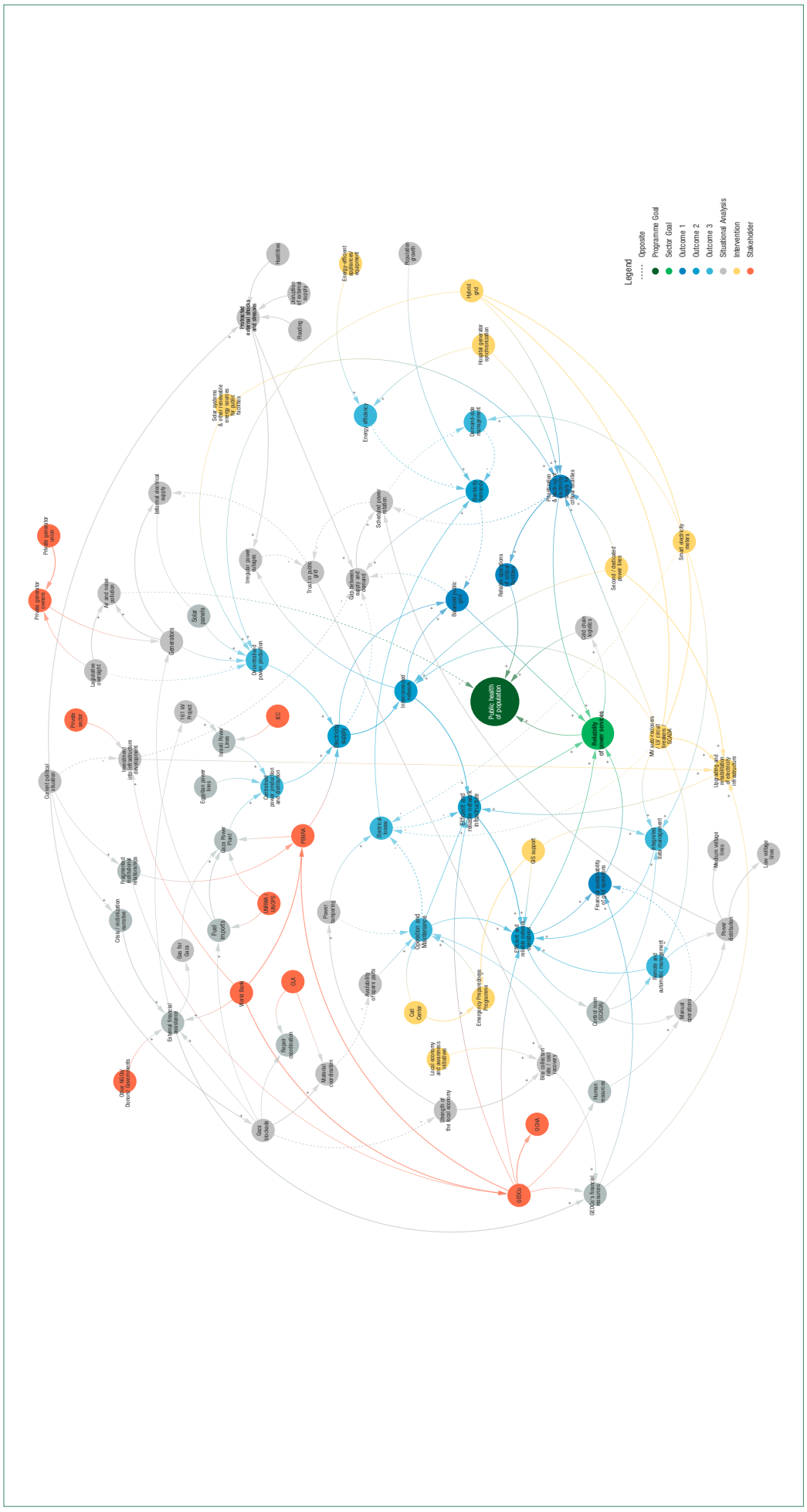

Figure 2.3 An expanded mind map that untangles many of the interdependencies in Gaza. This activity is a visual demonstration of "triple-loop" learning.

Interviewing residents of a building having a parallel electrical network to be connected to private generators when the city power is not available.

J. Cameira/ICRC

3. LEARNING FROM GAZA

This chapter presents the lessons that have been and are being learned through the operational resilience approach to programmes that continues to be developed in Gaza and upon which the protracted conflict operations cycle is based. As discussed in Annex C, tentative first steps that began around 2015 have increasingly been centred around achieving a common goal and have been formalized in the ongoing GRP, which is expected to continue beyond 2025.

Gaza has been occupied at one time or another over the last century by Britain, Egypt and Israel. Now under full territorial closure and a naval blockade, it was attacked by Israel in 2001, 2008–2009, 2012 and 2014 and has experienced frequent smaller-scale hostilities since then. This violence has been characterized as a blend of "episodic" and "fragmented and mutating" conflict,[19] and has affected just about every aspect of society in Gaza. The ICRC has had a presence in Gaza since 1968 and has been running assistance programmes since 2006. Reflecting on this commitment, senior ICRC managers question the effectiveness of repeated annual plans and are thus quite open to horizon-scanning intelligence if it leads to innovation that will help them achieve their aims.[20] The operational resilience approach is one such break with tradition, offering several lessons to those who are ready to learn them.

3.1 HOW ORGANIZATIONS CHANGE

If the goal of the change required within the organization is clear – in this case, to improve humanitarian operations, including designing operations that have a sustainable humanitarian impact in protracted urban armed conflicts – the path to get there is usually not. Attempts to change an organization's culture must confront the resistance to change that derives from an established way of doing things, conflicting interests and mandates, as well as challenges inherent to each situation.[21] In developing operations that target the complexity of protracted urban armed conflicts, the planners must take into account the habits, instincts and incentives that have built up from the very inception of the ICRC and the birth of humanitarianism. The expertise that was originally marshalled and developed reflected the challenges at that time, which were often rural or clearly defined wars. The experience has led to calls to "work deep",[22] that is, to complement the classic lifesaving activities with a more system-wide approach of a preventative nature that factors in the public health pyramid, the continuum of care and, more recently, a wide-ranging palette of mutually reinforcing short- and long-term activities.[23]

Such expertise is also known to set up what is referred to as path dependency, i.e. a dynamic that ensures which past habits dictate current ones. Apart from the resistance to change that seems inherent in most people, organizations develop their own inertia with every *pro forma* document, reporting procedure and support structure they create. A basic theory of change suggests that **it is the first supporters of thought leaders who determine which ideas end up changing the world and which simply die out.[24] Very curious thinkers develop interesting ideas every day, after all, but these ideas remain abstract if no one acts on them. In other words, every initiative needs to be championed**.

19 ICRC, *Protracted conflict and humanitarian action*, p. 10, 2016.

20 Interviews IL/OT 1 and IL/OT 2. Note on the interview nomenclature: As part of this study, the author conducted interviews with a number of in-house and external stakeholders between January and June 2020. In order to preserve the interviewees' anonymity, the interviews are referred to in these footnotes using the nomenclature set out in the table at the start of Annex F – Methodology.

21 See D.C. North, *Institutions, Institutional Change and Economic Performance*, Cambridge University Press, Cambridge, 1990.

22 ICRC, *Protracted conflict and humanitarian action*, p. 28, 2016.

23 ICRC, *Public Health Engineering During Armed Conflict: 1983–2013*, ICRC, Geneva, 2013.

24 G. Sharp, *The Politics of Nonviolent Action*, Porter Sargent, Boston, 1973.

The experience with operational resilience in Gaza is no different: the path towards the destination sets out in one direction, leads into another, doubles in on itself and is littered with obstacles both big and small throughout its entire length. As Section C2 documents, the innovative process was borne by several first supporters and key pieces of analysis. In addition, the testimonies of people at the heart of the process have revealed the primary benefits, lessons and limitations of the process, which are described below.

3.2 SOME ADVANTAGES OF THE OPERATIONAL RESILIENCE APPROACH

3.2.1 MANAGEMENT ADVANTAGES

One of the key benefits of the operational resilience approach that was noted by ICRC managers was its alignment with existing ICRC policy. By running operations through the prism of public health, for example, the approach serves very practically to further develop the prevention logic framework.[25] Perhaps even more importantly, **the operational resilience approach can help a mission or delegation move from an exclusive focus on curative care to also initiating preventative measures as seen in the continuum of care**.[26] Similarly, both water and electricity providers in Gaza noted that the resilience projects that they have been involved with have aligned well with their longer-term needs and master plans.[27]

The IL/OT mission's senior managers emphasized how the operational resilience approach encourages teamwork within delegations, and they appreciated its anti-silo, transversal, holistic and multidisciplinary character.[28] The same characteristics were credited for attracting funding – especially in Gaza, where fatigue has set in following the repeated destruction of civilian infrastructure and the decline in essential-service delivery. Considered alongside the push to combine emergency and development activities, an openness to innovation and the greater involvement of the community that the operational resilience approach promotes also appeal to donors.[29]

3.2.2 SHIFTING MINDSETS

Senior managers also stress how the operational resilience approach has either "shifted the mindset" or, at the very least, generated discussions that can shift delegates' mindset.[30] Considering the intractability of the challenges in Gaza in particular, managers expressed appreciation for the way in which **the operational resilience approach helps to gear activities and actions towards projects and programmes that can target both secondary and direct beneficiaries over the short- and medium-term** (see Section 2.3).[31] Other interviewees appreciated how the approach forces them to broaden their operations outside of their comfort zone and target a greater number of beneficiaries.[32]

A culture of critical thinking has also been established to a certain extent within Gaza's WatHab team.[33] Each of the engineers interviewed expressed how they tackle each new project "with a long-term view", for example, or in order to "maximize the number of interlocutors and beneficiaries",[34] even without a subdelegation-wide common understanding of the operational resilience approach (see Annex C).

25 Interviews IL/OT 1, IL/OT 2, IL/OT 8.
26 Interviews IL/OT 1, IL/OT 2, IL/OT 8.
27 Interviews Partner 3, Partner 6.
28 Interviews IL/OT 1, IL/OT 2, IL/OT 8, Gaza 6.
29 Interviews IL/OT 1, IL/OT 9, GVA 1, Gaza 6, International 1.
30 Interviews IL/OT 2, IL/OT 7, IL/OT 8, Gaza 2, Gaza 6.
31 Interviews IL/OT 2, IL/OT 8.
32 Interviews IL/OT 7, IL/OT 8.
33 Interviews IL/OT 9, GVA 1.
34 Interviews Gaza 1, Gaza 2, Gaza 3.

3.2.3 NEW AND *BETTER* PROJECTS STEM FROM ANALYSIS

The considerable volume of analysis (reviewed in Annexes C and D) has clearly paid off in many ways, according to the engineers and others interviewed. As discussed in Section C2, they credit the string of analytical reports and internal brainstorming sessions for enabling projects that would not have otherwise even been considered.[35] While the remote control of wells and electrical generators was primarily initiated to reduce the risk posed to the personnel of service providers during times of active hostilities, it also serves to meet the ICRC's goals of flexibility and interdependence. Of note is the fact **that service providers (some of whose employees were killed or injured in the past) praise the fact that their staff will be exposed to less risk during future emergencies**.[36] Just as crucially to the service providers, **projects designed using the operational resilience approach encourage routine operations and maintenance (O&M) activities rather than shunning them as lost or sunk costs**, as is the case with many projects for which they receive assistance.[37] Perhaps even more importantly, the **projects may also provide a higher bill collection rate**,[38] and **lead to the suite of "digital services" type of projects** described in Annex D.

The HIA scoping study filled a similar niche by moving beyond the typical infrastructure projects to consider the relationship between environmental health and public health – well before COVID-19 became a concern.[39] As it is difficult to demonstrate direct links between projects and health outcomes, the analysis and knowledge that the scoping study called for is often eclipsed by more typical projects that undertake environmental or social impact assessments.[40] In the same vein, **the operational resilience approach is credited by every Gaza-based interviewee generally for leading to longer-term and broader projects. The approach has further encouraged closer engagement with communities and provided them with better access to essential services**.[41]

3.3 SOME KEY LESSONS

3.3.1 LEARNING ABOUT LEARNING

While learning is central to the protracted conflict operations cycle, a key concern that the documentation of the operational resilience approach has revealed is that **not all lessons that could be learned are being learned consistently**. Despite application of the ambitious and successful triple-loop learning process, which spawned the operational resilience approach (and the protracted conflict operations cycle described in Section 2), not all of lessons learned have been fed back. That is, the resilience projects discussed in Annex D do not consistently manage to take advantage of the broadened monitoring methods, and even single-loop institutional learning does not occur consistently. Considered alongside the fact that the operational resilience approach is not yet commonly understood across the ICRC – or even within WatHab – this suggests that the approach itself remains vulnerable to becoming diluted to the point of meaninglessness.[42] In other words, as the operational resilience approach continues to evolve, there is the possibility that it could come to mean only a fraction of how it has been defined here and that the protracted conflict operations cycle that developed from it will remain on the shelf. The vitality of the entire initiative could be replaced with mundane messages such as "take the long-term view" or "engage with the communities".

35 Interviews Gaza 1, Gaza 2, Gaza 3.
36 Interviews Partner 3, Partner 4, Partner 5.
37 Interviews Partner 1, Partner 3, Partner 4, Partner 7.
38 Interview Partner 1.
39 Interview Partner 6.
40 Interview Partner 6.
41 Interviews IL/OT 1, IL/OT 5, Gaza 1, Gaza 2, Gaza 3, Gaza 6, Partner 4.
42 Interviews GVA 1, Gaza 5.

3.3.2 COLLECTING AND COMMUNICATING ANALYSIS

The resilience projects that are profiled in Annex D demonstrate just how central analysis is to the operational resilience approach. The operational resilience approach does not lead to activities designed through a quick site visit and based on decades of experience, which is a typical process in classic emergency contexts. The emphasis placed on understanding complexity has numerous advantages, particularly in terms of providing data that will persuade the people we work with. To a significant extent, then, **the persuasive capacity of the operational resilience approach relies heavily on its provision of evidence**. Evidence that stems from some of the volumes of analysis produced in Gaza has already been used by the WatHab Unit and the Legal and Protection Divisions in their dialogue with belligerents, for example, as it shores up confidence in the qualification or quantification of the reverberating effects of the CoH.[43] Certain types of evidence are more persuasive than others when it comes to service providers and other external partners.[44] For example, the initial findings of improved efficiency and reliability of the electricity supply (from the April 2020 Smart Meters report) cemented the Gaza electricity provider's interest in renewing its commitment to the project – and to replicate it in other areas.[45] **Indeed, many projects can be considered win-win-win, in the sense that they benefit the service providers and the communities while meeting specific ICRC objectives.**[46] Because not all evidence and analysis can be generated in-house, there is a clear role for external consultants. Specialists in different domains have served the operational resilience approach by focusing their competencies on particular knowledge gaps and by thinking outside of the ICRC box. Engagement with external analysis (and analysts) has been further credited with crystallizing ideas and initiatives that had been developed to different degrees in various quarters.[47]

Similar types of evidence presented in more storytelling fashion help convince the general public, even though the level of awareness of the general public about the operational resilience approach remains unknown and is probably low. The short video Interconnectivity of Systems produced by the WatHab Unit and the Communications Department may help to convey the intricate interdependencies between water, electricity and human health in Gaza, for example. Here, the role of communications is considered integral to the success of the initiative, in terms of managing both internal and external perceptions of the approach, as well as of facilitating better visualizations that will help with its uptake. Much greater outreach to the general public may come through interactive reports like the I Saw My City Die video or the Kerzgesagt method, which has proven so popular with the *Nuke a City* piece, and will rely on evidence gathered in the course of future resilience projects undertaken through the GRP.[48]

43 Interviews IL/OT 1, IL/OT 2, IL/OT 4, IL/OT 8, Gaza 6.
44 Interview IL/OT 1.
45 Interviews IL/OT 9, Gaza 1, Partner 1, Partner 3.
46 In such instances, the ICRC has been more assertive in communicating the evidence and analysis to partners. It does so by producing external versions of reports and encouraging local actors as well as external support agencies to factor this best practice and lessons learned into their operations and programmes in order to take resilience-building measures to scale across Gaza.
47 Interviews GVA 1, GVA 2, GVA 3, IL/OT 9.
48 Interviews IL/OT 6, IL/OT 9.

3.4 SOME LIMITATIONS OF THE OPERATIONAL RESILIENCE APPROACH

There are a number of drawbacks to the operational resilience approach that should be evaluated independently once the GRP is fully under way (as discussed in Section C4). For example, **most respondents found much of the analysis and discussions around it overwhelmingly complicated**. Existing staff risk being demotivated if they are obliged to integrate what is seen as convoluted analysis into their routine. Likewise for mobile staff, who may be discouraged from fully adopting the approach by relatively short assignment lengths and high turnover rates.

Others expressed concern that the operational resilience approach is seen as a way to make people themselves more resilient to problems that are systemic and chronic (i.e. the closure of Gaza), and **projects that arise from it may thus be disempowering**, or worse (i.e. so-called bad resilience, as described in Annex B). Other concerns derive from the perception of mission creep – where ICRC activities start to overlap with the tasks of local authorities – since supporting (or challenging) the government master plans exposes the ICRC to the traditional politics of development. For example, efforts to support the development of informal electrical grids could be perceived as running the risk of weakening the utility that is in charge of the operation and maintenance of the formal grid, thus undermining the authority of the electricity providers. Because they are informal, furthermore, the existence and location of such grids run the further risk of not being communicated routinely to belligerents, thus weakening their adherence to international humanitarian law (in the sense that the destruction of the informal grids would not be "reasonably foreseeable"[49]).

There are also concerns about the replicability of the protracted conflict operations cycle. Even if another project was fortunate enough to have a champion, open-minded staff, brilliant communicators and external funding – all factors noted as key to the approach in Gaza (see Annex C) – there is no guarantee that the same results would be achieved. There are considerable features in Gaza that make the situation there unique and that would therefore be expected to limit the applicability of the operational resilience approach to other situations.

Firstly, Gaza is well-suited to the operational resilience approach because it experiences periods of relative calm, despite its closure and the recurring hostilities.[50] When considered in the light of Gaza's strong governance and government structures,[51] the years of relative calm in between attacks have allowed operational resilience ideas to germinate and grow. The process has been greatly facilitated by generally high levels of education and knowledge among the general public combined with capable partners,[52] yet these factors may not be present in other situations. The forward-thinking findings of the HIA scoping study would not have been possible, for example, if it was not able to build on the baseline drinking water survey and the water authorities' annual reports (Annexes C and D). Gaza is also particular in the sense that it is rather small, and the people are hemmed in from all sides. Several interviewees referred to Gaza as a "laboratory" where one could test and pilot initiatives and collect data in order to refine them.

49 Interview IL/OT 4.
50 Interviews IL/OT 1, IL/OT 2, IL/OT 6, IL/OT 9, Gaza 5.
51 Interviews IL/OT 7, Gaza 5.
52 Interviews IL/OT 3, IL/OT 7.

Canada Well, Rafah, Gaza – The ICRC supported the installation of Solar PV net metering system and dedicated power line to improve resilience and reduce operating costs for a critical public water supply facility.

H. Mhanna/ICRC

4. TOWARDS MORE EFFECTIVE HUMANITARIAN OPERATIONS

Respondents have identified many benefits that have derived from the application of operational resilience and institutional learning in Gaza. Most importantly, partners have labelled the projects initiated under the approach as "better" in the sense that they help maintain a minimum level of service during hostilities and a more reliable service during periods of relative calm. If there is a single quality that distinguishes the protracted conflict operations cycle from the established way of working, it is the emphasis that it places on learning. If the ICRC is to remain relevant in protracted urban armed conflicts and build upon the success already achieved, it will have to continue to learn. There are a number of steps that must be taken to reach that destination.

4.1 STEPS THAT THE IL/OT MISSION AND THE GAZA RESILIENCE PROGRAMME CAN TAKE

The pressure is on the multi-year GRP. The GRP will prove its worth if it can demonstrate tangible outcomes, but in order to do that, staff working with or alongside the GRP are encouraged to:

- **nurture and develop the culture of learning**, most notably to develop a common understanding of the GRP, of operational resilience and of the protracted conflict operations cycle. The more that staff are involved in double- and triple-loop learning, the more effective the GRP will be.
- **evaluate the GRP**, independently, in years 2 and 4 and following the end of the programme. The evaluation should not only check results against the stated objectives and any plans for monitoring, but also critically query the protracted conflict operations cycle stages (Understanding, Planning, Executing, Learning) with single-, double- and triple-loop learning in mind.
- **integrate the stages of the protracted conflict operations cycle** into existing processes by refining and streamlining the processes and ideas that have already been developed. Some of the specific tools include: the design guidance in Table E.1; the outcome mapping and severity assessment (Figure C8 and Table C2); and the many ways to manage complexity set out in Section A3. The figure of the protracted conflict operations cycle (Figure 2.1) can serve to guide the further development of the processes in Gaza, although the GRP managers must ensure this makes it squarely and in considerable detail into the bureaucratic processes (i.e. into the general and specific objectives set during the internal planning exercises). Such efforts will also serve to create a common understanding of the protracted conflict operations cycle.
- **update and evaluate the protracted conflict operations cycle.** It is a work in progress, and it must be allowed to continue to evolve as lessons continue to be learned in Gaza.
- **close the learning loops** (again and again). Considering the Gaza team's capacity and commitment, progress is inevitable so long as the learning stage of the protracted conflict operations cycle is considered most central by all involved. The benefits are most visible in how the "digital services" type of electricity projects has evolved (see Annex D). The enthusiasm that was felt from the IL/OT staff for some of the projects can become contagious, meaning the opportunity to establish a culture of learning remains ripe. Beyond the established monitoring and evaluation procedures, lessons may best be learned in this culture through brainstorming, mash-up or hack-a-thon events that encourage outside-of-the-box ideas when conceptualizing and designing, and – most critically – questioning assumptions following execution.
- **extend their efforts well beyond the WatHab and Health Units.** The benefits of the protracted conflict operations cycle approach have been thus far less demonstrated in EcoSec activities and remain to be developed for activities in the areas of protection and legal, and others. Operations that combine food, water, electricity and health are only a few steps away at this moment, and there is considerable scope for expanding the documentation of the reverberating effects of the CoH on all sectors.
- **begin to reap the rewards of the last several years of the resilience projects, beyond the GRP.** With the seeds sown by the tools developed and analysis conducted, the GRP is very well-timed to grow them and harvest what they produce. Yet, some tools that have been developed still have great potential to demonstrate their worth (notably the geo-referenced database), while

some of the analysis (such as the HIA scoping study and follow-on studies) is now well-suited to inform operations. The *Coping Mechanisms Catalogue* should be updated and expanded, for it may eventually lead to a catalogue of adaptation measures that will further learning. Ensuring the protracted conflict operations cycle approach continues outside of the confines of the GRP will liberate it in ways that are currently difficult to imagine.

- **reach outside the ICRC for high-end expertise** that can assist with analysis, design or learning.
- **collect evidence of the effectiveness of the protracted conflict operations cycle.** Such evidence has several advantages: it can persuade both partners and the communities of the merits of the operations, which reinforces trust and progress simultaneously; it increases the ICRC's accountability towards the communities and partners; and it will make it easier to define future objectives and identify beneficiaries.
- **communicate the effectiveness of the protracted conflict operations cycle approach much more productively.** The evidence collected should be made available in tailored forms to different audiences. The audience can be very broad, ranging from other ICRC units in other delegations to the ICRC president and advisers, donors and other agencies. The forms of communication for each could include stories, reports, videos, public opinion pieces and diplomatic briefs.
- **prioritize the ICRC's good reputation and its relationship with partner organizations.** There is a risk that zealous adherence to the protracted conflict operations cycle approach will jeopardize that relationship, if staff begin to promote pet resilience projects without considering partners' more urgent interests and needs.
- **ensure the established processes and culture are not diluted as a result of persistent resistance or of reverting back to previous methods.** The protracted conflict operations cycle and operational resilience would lose all their meaning in this case, and operations in protracted urban armed conflicts would remain ineffective.

4.2 STEPS THE ICRC CAN TAKE

The application of operational resilience and institutional learning in Gaza has demonstrated the leading role that the ICRC plays among humanitarian organizations and the extent to which it sets the agenda in higher-level policy meetings aimed at shrinking the space between emergency and development. In order to continue to play that role, or to play it even more effectively, the ICRC should:

- **further integrate the approach into the objectives of Orientation 2 of the ICRC's 2019–2022 *Institutional Strategy*:** Building Relevant and Sustainable Humanitarian Impact with People Affected.[53] The strategy calls for, among other things, engaging more systematically with, and strengthening the resilience of, beneficiaries; prioritizing feedback mechanisms; strengthening the ICRC's ability to address needs created by the breakdown of systems while continuing to respond to emergencies; and ensuring the ICRC continues to be a learning organization.
- **nurture and develop the culture of learning by integrating it into existing efforts to bridge the humanitarian/development nexus** (i.e. "working deep"[54]). The challenge of tackling complex protracted urban armed conflicts may be very different two generations from now. The more effectively faulty assumptions and the institutional culture that created them are addressed, the more likely the ICRC will continue to be effective. Put another way, as long as critical thinking, feedback and analysis support the execution of the ICRC's operations, the organization will prove resilient to all future uncertainties.

53 ICRC, ICRC Strategy 2019–2022, p. 14, 2019.
54 ICRC, Protracted conflict and humanitarian action, 2016.

- **continue to support the development of the protracted conflict operations cycle in Gaza by creating more institutional space and encouraging staff to reap the rewards.** While the GRP will engender its own evaluation (see above), the ICRC can – as a learning organization – initiate more innovative methods to test the utility of the protracted conflict operations cycle approach (e.g. through a full cost comparison with a classic emergency programme). ICRC headquarters can also support requests to build in access to external expertise and rely on the support of the Urban Programme Team. Such support aligns closely with objectives 2.5 and 2.7 of the *ICRC Strategy 2019–2022*.[55]
- **revisit the structure of the institutional support provided to units seeking to be more effective during protracted urban armed conflicts.** The ICRC's finance and human resources structures favour annual financial planning and short-term assignments, for example, whereas longer-term financial stability and positions would be a much better fit given the longevity of the challenge.
- **stake out the limitations of the operational resilience approach very clearly**, so that resilience or even the protracted conflict operations cycle approach itself does not become a goal in and of itself. For example, the extent to which a solid and working culture of resilience can be established among humanitarian organizations may be more limited than expected (i.e. there will be situations where immediate needs are too pressing, or the capacity to adopt complex processes does not exist).
- **introduce the protracted conflict operations cycle approach cautiously outside of Gaza.** There are many circumstances in Gaza that make an innovation like the operational resilience approach more likely to succeed (see Section 3.4). The protracted conflict operations cycle approach may nonetheless suit other operational situations very well. Any attempt to introduce it outside of Gaza should anticipate resistance and missteps (Section C5), however. In this regard, it is recommended that a protracted conflict operations cycle scoping study be run first to ensure the conditions are appropriate (i.e. that the ICRC has a solid reputation and good relationships, and that there are champions and first supporters).
- **be aware that this approach may bring the ICRC into realms it has less experience operating in.** Supporting the long-term plans of any political authority, even if there is a humanitarian rationale, exposes actors on all sides to agenda setting, manipulation and the geopolitical interests inherent in the politics of development. Development organizations are accustomed to this, but it is new territory for most humanitarian agencies.

55 For instance, this approach is fully aligned with the second objective in the Water and Habitat Strategy (2020–2023), which states: "By 2023, be able to promote a flexible, systemic and sustainable approach that engages with people affected by crisis to meet their long-term needs." The strategy can be accessed online here.

Interviewing technicians of the power utility while interviewing neighborhood residents.

J. Cameira/ICRC

ANNEXES

ANNEX A

TACKLING COMPLEXITY

This annex reviews some of the theory that has been developed to interpret the complexity of protracted urban armed conflicts, as well as the merits of "system of systems" thinking.

Few things exist that are more complex, interconnected, dynamic and uncertain than long-standing wars in cities. The complexity of protracted urban armed conflicts derives from both great amounts of extended uncertainty and very complicated processes and dynamics that characterize all cities and urban centres. The people who live through any type of long-term conflict know that their fate is determined by such factors as unpredictable changes in military alliances, geopolitical forces, developments in weapons technology, pandemics and natural disasters. Urban armed conflicts are just as uncertain, yet even more complicated. Most cities are composed of a great variety of types of communities, which may be the result of unplanned displacement or long-standing social, ethnic or economic divisions. Furthermore, all residents of cities have come to rely on a myriad of interdependent public services (e.g. health, electricity, water and security) for their survival and/or livelihoods.

Protracted urban armed conflicts are so complex that there is no reason to expect that a programme that works in one area will work in another, and scaling up or duplicating a programme is often not possible even within the same municipal limits. The question becomes what can be done about them.

In many ways, the challenges that humanitarian actors face in protracted urban armed conflicts oblige everyone to work harder and smarter. A few nuggets of wisdom drawn from a significant amount of complexity thinking can shift mindsets: all is fluid; nothing is linear; and what is readily observable may have little or nothing to with the bigger picture. Dealing with the individual parts separately is easier, not least of all because it is a well-engrained habit. Yet, addressing complex challenges through sharply focused organizational units and individual academic disciplines risks oversimplifying them and can in no way address the bigger picture.

Fortunately, with sufficient energy and thoughtfulness, the complexity of protracted urban armed conflicts can be tackled. The protracted conflict operations cycle draws heavily on system of systems theory. This theory considers the whole greater than the sum of the parts and is particularly well-suited to operationalize responses targeting the reverberating, indirect and cumulative impact of armed conflict. The method is heavily analytical and facilitated by tried and tested analytical methods that are reviewed below.

A1 CRITICAL INFRASTRUCTURE AND INTERDEPENDENT URBAN SERVICES

All services rely on infrastructure to function. Food services require roads and warehouses; water services need pumps and pipes; solid waste services require bins; health services require hospitals and health centres; and financial services require telecommunications lines. But many services can run with only portions of the infrastructure in place. For example, an immunization campaign can run to a certain degree even if many health centres are damaged, so long as the supply lines are intact and people are still willing to work.

The infrastructure required to keep essential services running is referred to as critical infrastructure.[56] Unhelpfully, the bulk of research on the protection of critical infrastructure is based either on stable situations or post-disaster recovery, or it relates to counter-terrorism measures. Seeking to support the implementation of "long-term sustainable, adaptive and resilient infrastructure systems",[57] this body of work emphasizes the interdependence of infrastructure components and the avoidance of "propagation of failure"[58] or "cascading failures".[59,60]

The study of critical infrastructure in times of war is much less developed.[61] Infrastructure has been considered in relation to armed conflict through its inclusion in the classification of upstream and downstream components of essential services, as seen in Figure A1.[62] And while all services depend on other services, the components of services also depend on each other. For example, even with well-maintained water infrastructure, experienced water utility staff cannot provide water to consumers if there is no power to run the booster pumps that maintain the pressure in the distribution network. Upstream components are seen as even more critical in the sense that their failure affects other components dependent on it.[63] A water treatment plant is considered critical upstream infrastructure, for example, because its failure would affect the pumping stations and hospitals that it serves.

56 For example, the UK's definition of Critical National Infrastructure is "...key elements of national infrastructure which are crucial to continued delivery of essential services to the UK. Without these key elements essential services could not be delivered and the UK could suffer serious consequences, including severe economic damage, grave social disruption, or even large scale loss of life", in R. Pant et al., "Analysing the risks of failure of interdependent infrastructure networks", in J.W. Hall et al. (eds) *The Future of National Infrastructure: A System-of-Systems Approach*, Cambridge University Press, Cambridge, 2016, p. 242.

57 R. Pant *et al.*, p. 241, 2016.

58 J.W. Hall *et al.*, "A framework for analysing the long-term performance of interdependent infrastructure systems" in J.W. Hall *et al.* (eds), *The Future of National Infrastructure: A System-of-Systems Approach*, Cambridge University Press, Cambridge, 2016, p. 13.

59 R. Pant et al., p. 241, 2016.

60 L. Wendt, A. Alobeidi and P. Straßer, *Gaza Electrical Resiliency Project Report*, Issue 3.1, ZGIS, Universität Salzburg, EO4Hum, 2019, p. 42 (not published).

61 See United Nations Institute for Disarmament Research, Understanding the Reverberating Effects of Explosive Weapons: A Way Forward, UN Institute for Disarmament Research, Geneva, 2016; and International Institute for Environment and Development, Water, crises and conflict in MENA: how can water service providers improve their resilience?, International Institute for Environment and Development, London, October 2017.

62 In fact, services require more than infrastructure. They require consumables (e.g. fuel, chlorine, medicines) and – most importantly – people. Health services can continue so long as there is someone to provide care, for example, even if all of the hospitals and health centres are destroyed (e.g. Aleppo).

63 M. Talhami and M. Zeitoun, "The impact of explosive weapons on urban services: direct and reverberating effects across space and time", International Review of the Red Cross (IRRC), Vol. 98, No. 1, 2017, pp. 53–70.

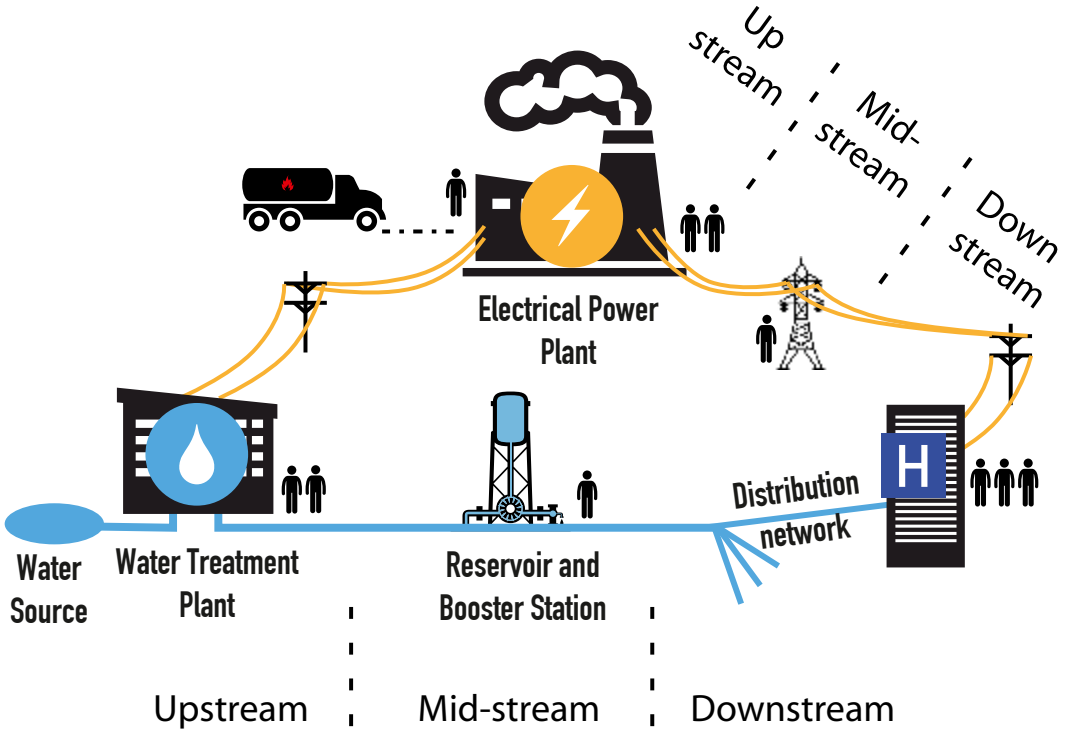

Figure A1 Sketch showing the hierarchy of service components in an interdependent system. Upstream components (people, consumables and infrastructure) are more critical.[64]

Those who are concerned about protracted urban armed conflicts must also consider the nature of the impact of conflict on interdependent urban services. The most visible form of impact is direct damage, following an explosion. When a tank round pierces a concrete water reservoir, for example, the integrity of the concrete is breached, the steel rebar is peeled back, and the inside of the reservoir is contaminated by the explosive debris. Direct impact is also the easiest to respond to. Indeed, repairing direct damage has become the core of humanitarian culture, as discussed earlier.

The operational resilience approach is focused more on the indirect impact that follows from the direct impact, because it is extremely common – yet under-addressed – in protracted urban armed conflicts.[65] When a transformer that has not been maintained properly falls into disuse, for example, there is little that electrical repair crews can do if the repair vehicles are out of fuel or the parts that they require are not available in the market. As the conflict drags on, such indirect impacts begin to accumulate. In Basra, for example, the world-class drinking water service enjoyed by citizens in the 1990s declined to worst-class status by 2019 owing to a predictable chain of failed attempts at high-tech desalination alternatives, the spread of cholera and riots (see Figure A2). The effects can accumulate to the point that any future effort is wasted,[66] and development holds[67] become no longer conceivable. More effective humanitarian programming would seek to avert the downward spiral of cumulative impact, and incorporating operational resilience into the design process can be of help.

64 *IRRC*, 2017.
65 ICRC, *Urban services during protracted armed conflict*, 2015.
66 *Ibid.*
67 Development holds forestall development reversals, possibly leading to modest contributions to the SDGs, while still seeking to safeguard public health in times of crisis. See ICRC, *Armed Violence and the New Urban Agenda*, 2016, p. 25.

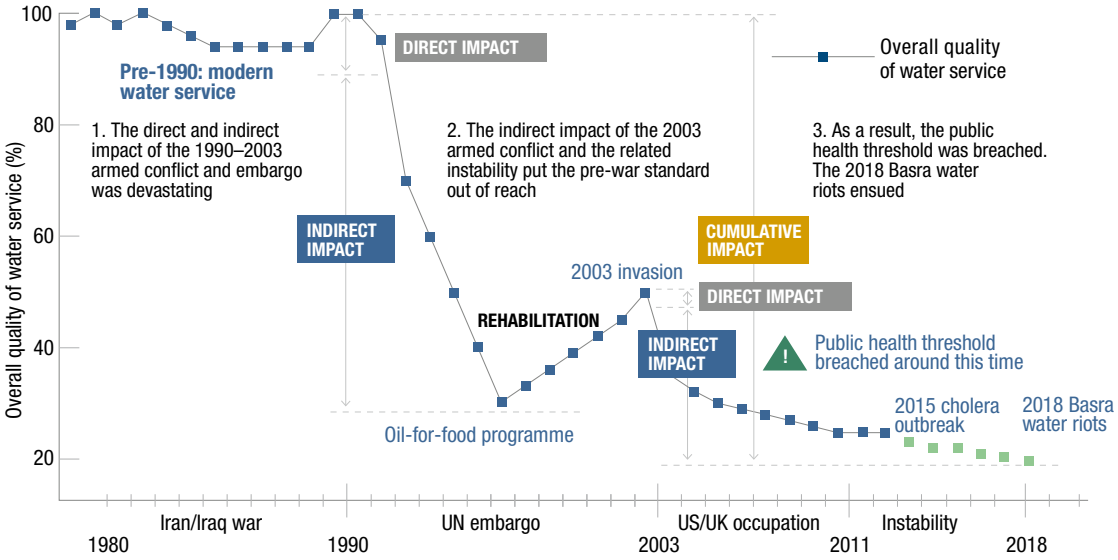

Figure A2 The long and predictable decline of the Basra water system.[68]

A2 UNDERSTANDING COMPLEXITY THROUGH SYSTEM OF SYSTEMS THINKING

As discussed in the main text, the complexity of protracted urban armed conflicts derives from great amounts of uncertainty and very complicated processes. System of systems thinking can be a useful first step in putting order into the complexity.

A whole is composed of many parts. If we accept that each of the examples discussed is only a part of a process or service and that each process or service is dependent on the others, all the constituent parts can be thought of as a whole system. What has not yet been considered is the way people respond, whether formally or informally, outside of this system. Maybe they can change their lifestyles (by coping with less water, for example, which means less water is required), develop community support projects or leave the area affected by the conflict. When these options are considered together, they could be considered a social (or coping) system that is in many ways separate from the water or health systems. One could further track the number of ecosystems that affect the spread of disease, with an awareness that the alarming rates of spread of antimicrobial resistance is due not only to the intensive use of antibiotics in livestock rearing and over-subscription by doctors, but also to the extremely high rates of wounds, and the prescription of the wrong type of antibiotic.[69]

If we consider a child who has recently arrived in the city and develops a wound or communicable disease, we realize that both the manner of affliction and the healing process are influenced to some degree by all of these systems. The exposure to disease could be the result of drinking unsafe water from an open source (which is a way of coping with an interrupted water supply), while the recovery in hospital could be helped or hampered depending on the level of family and community support, the attentiveness of staff in the hospital and the effectiveness of the medications they prescribe. The entire system is made up of particular ecosystems, social systems, health services and water services and is influenced by the ideological, political and economic forces that led to the armed conflict in the first place.

68 Draft based on M. Zeitoun et al., "Urban Warfare Ecology: A Study of Water Supply in Basrah", *International Journal of Urban and Regional Research*, No. 41, November 2017, pp. 904–925.

69 M. Zeitoun *et al.*, "AMR and Covid-19 on the Frontline: A Call to Rethink War, WASH, and Public Health", *Annals of Global Health*, 87, February 2021, pp. 1–6.

A3 A FEW WAYS TO ORGANIZE COMPLEXITY

Analysts have developed a number of ways to interpret system of systems thinking, each of which will help with single-, double- or triple-loop learning. The following brief review of methods shows that they all involve mapping or modelling. Each approach will have its merits and disadvantages – not least of all because the analyst must choose where and how to bound the complex challenge being addressed. The resultant analysis remains at constant risk of either being cut off too narrowly (over-simplification) or left too broad (making it difficult to communicate to others, and even more difficult to act upon).

DEPENDENCY MATRICES

Any system that can be thought of with two clear interdependent categories lends itself to analysis through dependency matrices. The interaction of two urban services can be considered for its effect on a third through this method. A matrix could be used, for example, to show (1) how different levels of electricity supply (in rows) could affect water service levels for particular areas (columns) and (2) the expected or observed effects on the incidence of communicable disease (through the traffic light system of green-amber-red).

		WATER SERVICE LEVEL			Risk of spreading disease
		Neighbourhood A (with two hospitals)	Neighbourhood B (with IDP camp)	Neighbourhood C (suburbs and industrial park)	
Coverage of electricity supply	Critical services only	High	Low	Low	Red
	Critical services and households	High	Medium	Low	Amber
	Full coverage (including industry)	High	High	High	Green

Figure A3 Sample of a simple dependency matrix showing the links between electricity coverage and quality of water supply in different neighbourhoods and the expected impact on public health. See also Figure C5.

This may be the simplest mode of analysis, and it can be extremely fit for purpose. It may also serve as the basis for an even deeper analysis. The manner by which the relationships change over time, for example, can be shown through multiple matrices, and these can then be compared. The method is less able to usefully present relationships that are less direct or any processes that follow elliptical rather than straight-line logic.

TWO-WAY GRAPHS

A system with dual main relationships (e.g. influence vs interests) can also be graphed in a form that may be easier to communicate, particularly for those who readily absorb visual or spatial clues. The example in Figure A4 highlights key actors to engage before a WatHab project in Gaza is designed (microgrids/feed-in tariffs; see Section E4) by plotting the expected level of support or resistance of different groups against their relative influence over the process. Apart from the position of well-known actors (e.g. the energy authority PENRA), the graph highlights others like local businesses and municipalities that should be brought to the table.

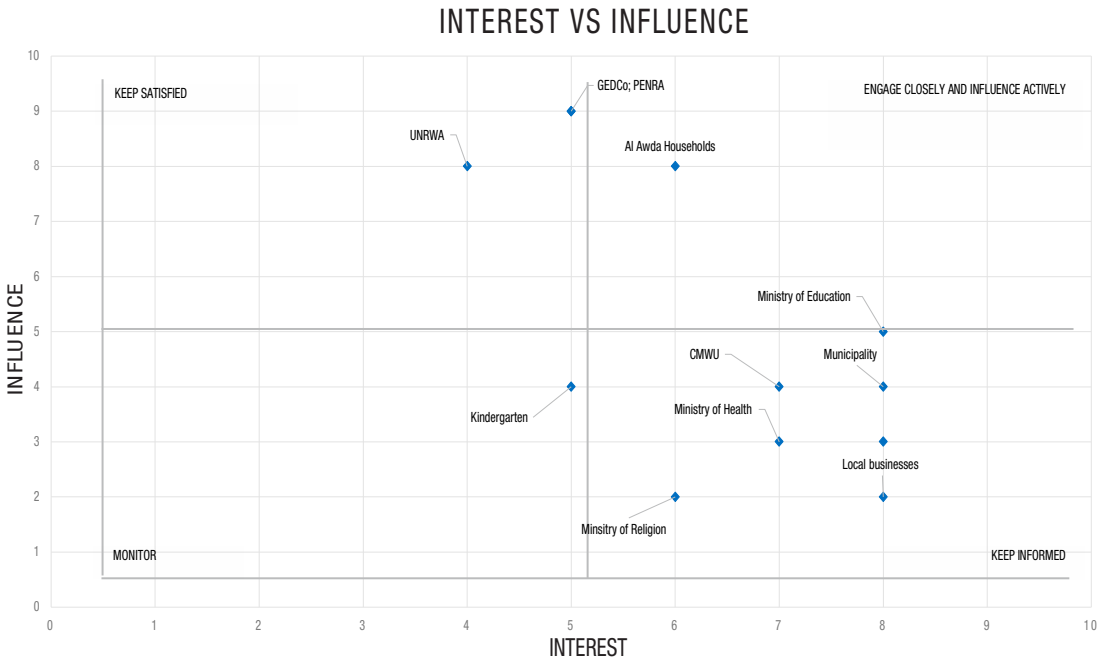

Figure A4 Example of a two-way graph used to map stakeholders in Gaza.[70]

The sophistication of this method of stakeholder analysis can be enhanced by visual clues, such as colours or symbols or, as in the example above, the size and shape of the group (which reflects the breadth of opinion and influence within the group).

70 Internal document: ICRC, *Microgrid Feasibility Study, Al Awda Towers, Beit Hanoun*, WatHab Report, August 2021 (IL-GAZ-ASSENG-19-8-0011).

CONCEPTUAL MAPPING

Most challenges in protracted urban armed conflicts are so complex that they must take into account more than two or three determining trends as well as the dynamic interaction between them. This is particularly the case where informal processes or non-physical elements are important, as in just about every system that involves people. The system of systems approach suggests basic stakeholder analysis be augmented by mapping out the dynamics more conceptually. It has several names for these, such as conceptual maps or mind maps. The ICRC teams in Gaza have leant towards this method. Figure A5 illustrates four samples of the system of systems maps that have been produced over the years to capture the interdependent relationships among Gaza infrastructure networks.

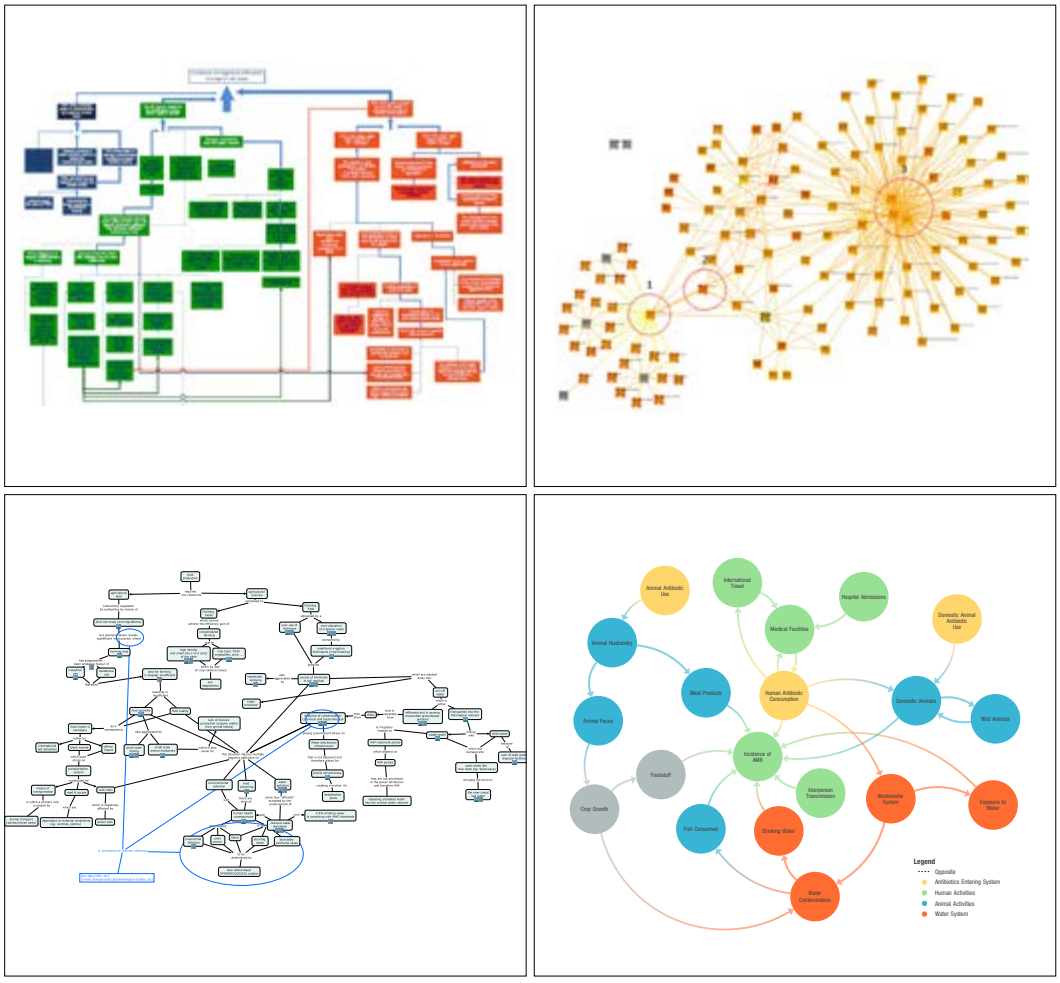

Figure A5 Clockwise from the top left: problem-tree analysis of the water sector, Gaza WatHab team, 2013; Gaza Infrastructure Risk Model (property software RiskLogic), 2017; concept map for Planning for Results (PfR) preparation, ICRC WatHab Unit, 2018; mind map of the farming sector, developed with Kumu software, 2020.[71]

71 All illustrations are from ICRC internal documents.

Figure A6 shows the latest example of this journey: a mind map created by WatHab illustrating the energy sector. This approach creates links between narratives, challenges, solutions and issues in a way that conventional documents would struggle with (see Figure 2.3, for example). The mind map can also be leveraged to include the elements that form the theory of change within the programmatic strategy.

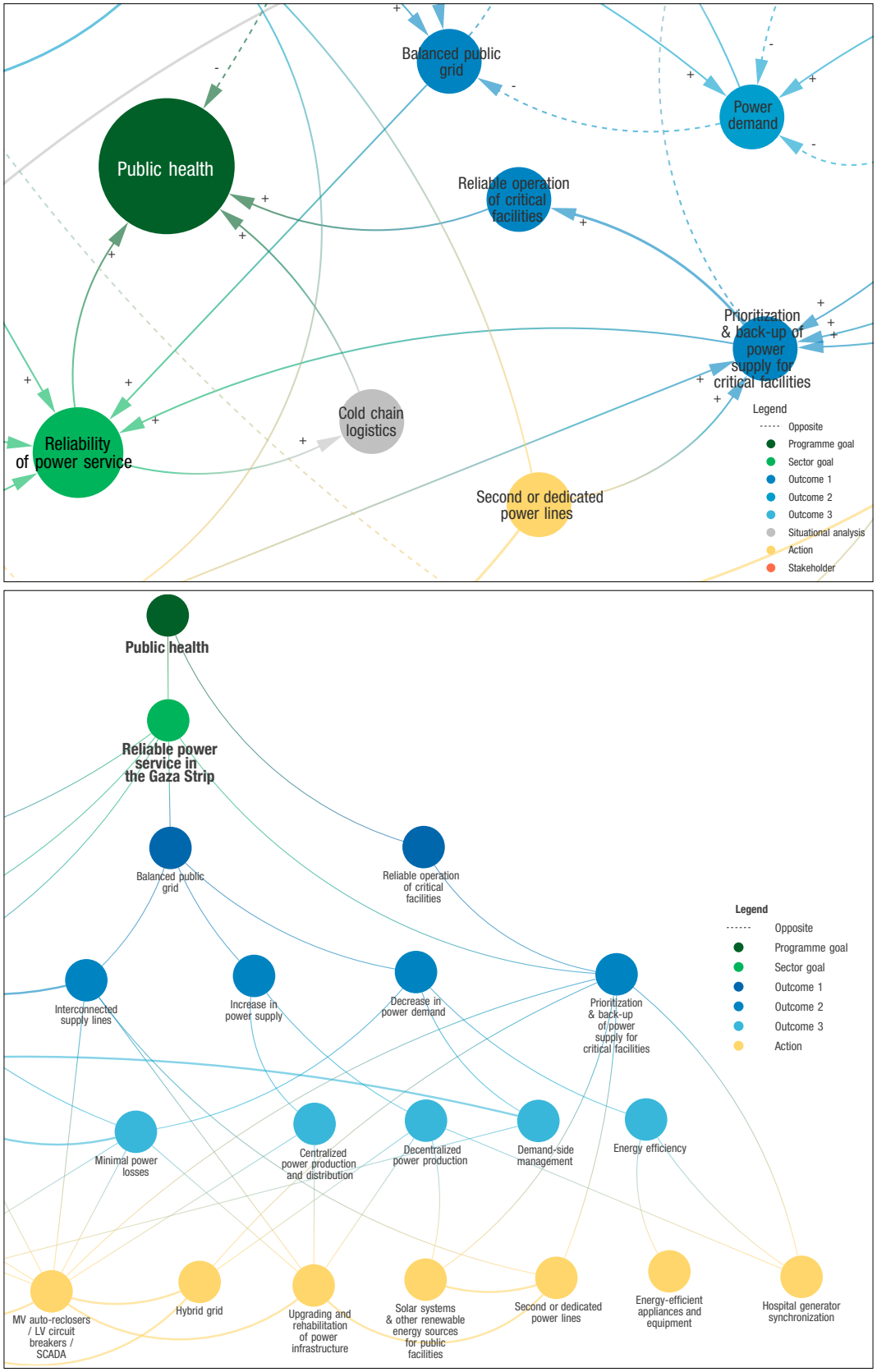

Figure A6 Example of the power sector system of systems map and, below it, the resulting theory of change.

SOCIAL NETWORK ANALYSIS

Operations that target communities may require even greater emphasis on the social relations between people. Great strides in social network analysis have been made recently, thanks to all of the data created by social media. An examination of patterns reveals who calls who, when and about what, and this can often be different from what is expected. The WatHab coordinator in Jerusalem, for example, may be unexpectedly central to even the most remote of residents in Gaza, as depicted in Figure A5.

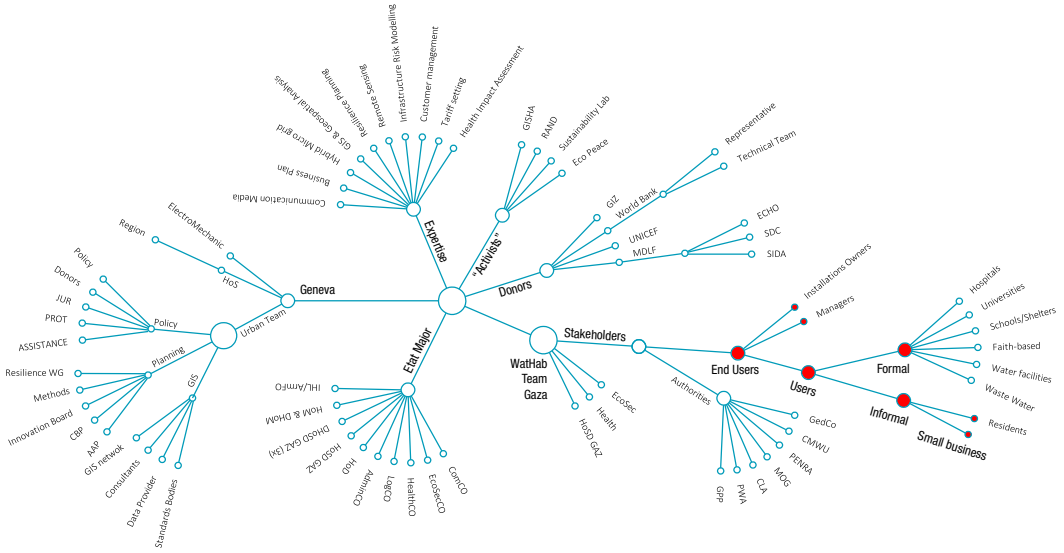

Figure A7 Comparison of formal hierarchies and real-world networks.[72]

AGENT-BASED MODELLING

Agent-based modelling takes system of systems thinking further by integrating system dynamics into the analysis with agents at their heart. This allows for the identification of micro-processes and multiple feedback loops in ways that can better capture path dependency, intuition, customary and informal rules, traditional and informal knowledge and so on. Five steps are proposed – frame the question, specify the issue, collect data, run the model and develop alternative scenarios[73] – and a visual example is provided in Figure A8.

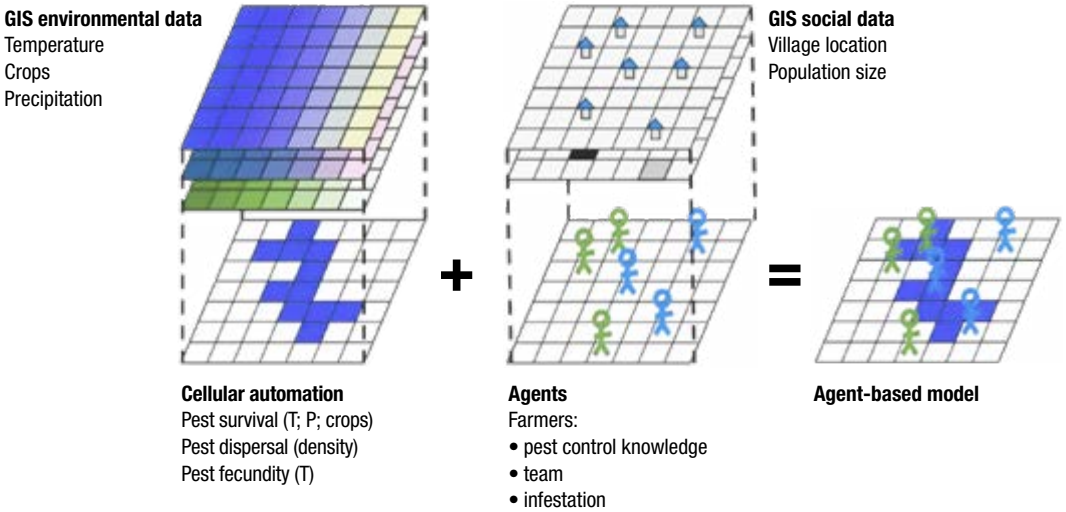

Figure A8 An example of the integration of agent-based modelling, driven by geo-referenced environmental and social data.[74]

72 Internal document: ICRC, *GRP presentation at WatHab Coordinators workshop*, 2019 (190402_ UrbanSessionResilienceGaza.pptx, slide 66).

73 Ramalingam, p. 285, 2013.

74 S.-A. Jules-Plag, "Supporting the Implementation of SDGs", *Geospatial World*, 15 August 2016.

ANNEX B

RESILIENCE

This annex scrutinizes the origins, benefits and limitations of resilience as a concept that can prove useful to address the complexity of protracted urban armed conflicts. It presents the three capacities of resilience (to cope, to adapt and to recover better) and several resilience characteristics (e.g. flexible, inclusive and redundant) that form the basis for the protracted urban armed conflict design characteristics presented in Section 2.2.

B1 THREE CAPACITIES OF RESILIENCE

Resilience means different things to different people. Researchers who study the long-term effects of trauma on the mental health of children, for example, describe those who are more flexible as having greater psychological resilience. Similarly, ecologists who undertake environmental impact assessments of infrastructure projects are less concerned with the species that are resilient in the face of construction than they are about those that might suffer irreversible damage.

The thinking on resilience has progressed in a number of fields, particularly among development agencies seeking to reduce the vulnerability of communities or individuals,[75] **and where neither development nor emergency programming works well.**[76] The body of literature has clearly refuted the idea that the poorest are more vulnerable to disasters,[77] noting how some wealthy communities may be as – or even more – exposed to shocks as people who earn less.

Consider how coastal erosion affects both traveller families living in trailers and large landowners with homes perched on cliffs. Both communities are exposed to the hazard,[78] and the landowners arguably more so. Equipped with insurance and influence over zoning regulators, however, the landowners have a much greater capacity to recover.

A review of the coping and adaptation options available to different communities shines a light on the very different abilities of each community to cope, adapt or recover from a hazard. In deploying their insurance to purchase new homes set back further from the coast, landowners are adapting to the hazard. An alternative would be to try to cope with the hazard by building coastal defences to protect against the erosion (or by lobbying their government to build defences on their behalf). The traveller community may be able to adapt much more readily by moving their trailer-homes within hours to another plot of land. If there is no unowned land nearby to move to, the traveller families may adapt by moving to a much more distant land to re-establish their society or simply cope with the rising sea level by living with it (i.e. among puddles that would be contaminated with wastewater).

75 See W.N. Adger, "Vulnerability", *Global Environmental Change*, Vol. 16, No. 3, August 2006, pp. 269–281.

76 See N. Mulhem, Working in Fragile and/or Conflict-Affected Contexts: Challenges and Opportunities for GIZ Corporate Survival, GIZ, Amman, 2015 (not published); United Nations Development Programme, *Yemen Resilience Programme – Policy brief*, UNDP, New York, 2015; and Rural 21, "The nexus: Joining forces - peace-building, humanitarian assistance and development cooperation", *Rural 21 – The International Journal for Rural Development*, Vol. 53, No. 1, 2019.

77 *C. Béné et al.*, "Resilience: New Utopia or New Tyranny? Reflection about the Potential and Limits of the Concept of Resilience in Relation to Vulnerability Reduction Programmes", IDS Working Papers, Vol. 212, No. 405, January 2013, pp. 1–61.

78 Hazard is defined as the degree of risk multiplied by the exposure to that risk, i.e. there is no hazard if you are not exposed to a risk. See B. Wisner et al., *At Risk: Natural Hazards, People's Vulnerability and Disasters*, 2nd ed., Routledge, London, 2003.

Both the wealthy settled community and the dynamic community living on the margins are able to adapt to the hazard, and each can cope with it. But one (the landowners) has the ability to protect or recover, while the other (the travellers) has the ability only to avoid or live with the hazard. While some of the individuals in each community may prefer to have different options, both communities can be considered resilient, but in very different ways.

The example shows first of all that resilience is a neutral term, neither good nor bad, and possibly both. More conceptually, the example also shows that resilience is derived from three different capacities, as shown in Figure B1. That is, any measure of resilience is a combination of the ability to cope, the ability to adapt and the ability to recover (or to recover better; see Section B.4).

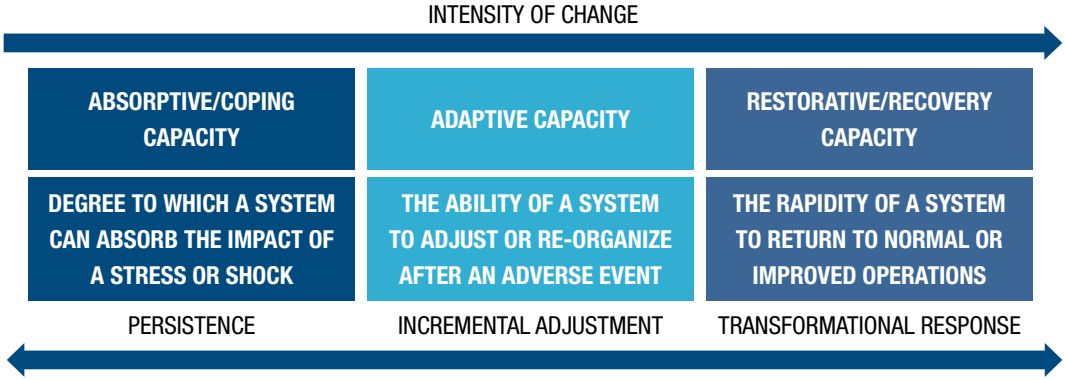

Figure B1 The three capacities of resilience.[79]

We can further note from Figure B1 that each capacity is related to the intensity of change: coping/absorbing maintains the status quo; adapting can lead to incremental change; and recovering/restoring can lead to step changes towards a degraded or improved state of affairs.

B2 RESILIENCE AS THE ABILITY TO BOUNCE BACK

More common understandings of resilience are similar, if not as nuanced. To many people, resilience means the ability to bounce back: to bend like a reed when a storm blows through, rather than to break like an oak.[80]

This metaphor has been applied to organizations, groups of people and activities. Institutional resilience is claimed by church groups and universities alike, as they recover to pre-pandemic times by offering previously face-to-face classes online. Similarly, much of the disaster risk recovery policy and research literature seeks to build community resilience through policy and infrastructure that minimize the community members' exposure to risk[81] in an effort to enable communities to return to normal after an earthquake or similar shock. Development agencies seek to build urban resilience in cities that are subject to massive inward migration,[82] in part by building the capacity of legal and social protection institutions to manage risks rather than to avoid them.[83]

79 Based on Francis & Bekara, 2014, in Houiellebecq, 2017, and C. Béné *et al.*, "Resilience: New Utopia or New Tyranny?", 2012.

80 Achille Etna Michallon, *The Oak and the Reed*, 1816.

81 UK Department for International Development, *Defining Disaster Resilience: What does it mean for DFID?*, UK Department for International Development, London, 2011; K. Brown, "Global environmental change I: A social turn for resilience?", *Progress in Human Geography*, Vol. 38, No. 1, August 2013, pp. 101–117; United Nations Development Programme, 2015.

82 ARUP, the Resilience Shift, the Rockefeller Foundation and the Stockholm International Water Institute, *The City Water Resilience Approach*, ARUP, the Resilience Shift, the Rockefeller Foundation and the Stockholm International Water Institute, 2019; World Bank, *Mini Grids for Half a Billion People: Market Outlook and Handbook for Decision Makers*, World Bank, Washington DC, 2019.

83 See for example United Nations University Centre for Policy Research, *Conceptualizing City Fragility and Resilience*, UN University Centre for Policy Research, New York, 2016.

B3 "BAD" RESILIENCE

Using the common understanding of resilience in an uncritical manner can lead to unintended consequences. Researchers have noted how its use tends either to ignore or downplay the agency/power and stated interests of individuals (because of its origins in environmental science and species in ecosystems)[84] or to entrench the conditions that led to the need to be resilient in the first place, by normalizing the situation to one that is (just) bearable for the people who are coping and adapting. Such normalization can remove the pressure or deflate initiatives that seek to transform the situation.[85,86]

The concern is that well-intentioned but uncritical attempts to build resilience can lead to the imposition of an order that none of the beneficiaries requested or desire. It is an apprehension that has been raised in the case of people living in Gaza: operations that help people cope with the conditions that result from the territorial closure and maritime blockade do not address the root causes of the conditions and therefore cannot improve them. In other words, if resilience were to become the goal, operations might seek to turn oaks into reeds – rather than provide them with the ability to bend in the wind – and ignore the forces that caused the storm.[87]

This dynamic has been referred to as "bad" resilience[88] and is a concern in all situations of protracted urban conflicts, because the normal, pre-event situation is not one that most would seek to return to. This begs the question whether a resilience approach can lead to the transformation of said conditions.

B4 RESILIENCE AS TRANSFORMATION: RECOVERING BETTER

We must leave the metaphor of the reed and the oak behind, if we are to consider the potential for resilience to lead to transformation. Considering how the members of a single household adapt to their home being destroyed by an earthquake, we can note that the capacity to respond changes with the conditions that are experienced (as the "intensity of change" of Figure B1 shows). If the tarpaulin tent they have set up for themselves (capacity to cope) immediately after the earthquake is not good enough six weeks on, the family may begin to build a home from tin sheets (capacity to adapt). Should the family have the funds to do so, it may decide six months on to build a home from bricks and mortar that is even better than the one that was destroyed (capacity to recover). Families that do not have the same resources will remain worse off than they were before the earthquake. In other words, transformation will necessarily occur should circumstances dictate and there is sufficient capacity to recover.[89]

The potential for transformation is the basis of the concept of "building back better" that is so prevalent in disaster risk reduction literature and programmes. Protracted urban armed conflicts are qualitatively different from disasters, of course, not least of all because of the enduring nature of the hazard (i.e. the armed conflict that never ends). People who have limited restorative capacity will be worse off in the long run; those with considerable restorative capacity may not simply recover, but recover better.[90]

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84 T. Cannon and D. Mueller-Mahn, "Vulnerability, Resilience and Development Discourses in the Context of Climate Change", *Natural Hazards*, Vol. 55, No. 3, January 2010, 621–635; M. Robards et al., "The importance of social drivers in the resilient provision of ecosystem services", *Global Environmental Change*, Vol. 21, Issue 2, May 2011, pp. 522–529; Brown, 2013; C. Béné et al., "Review Article: Resilience, Poverty and Development," *Journal of International Development*, Vol. 26, No. 5, July 2014, pp. 598–623.

85 D. Davidson, "The applicability of the concept of resilience to social systems: Some sources of optimism and nagging doubts", *Society & Natural Resources*, Vol. 23, No. 12, August 2010, pp. 1135–1149; Brown, 2013.

86 Béné notes further drawbacks to the term "resilience", including adaptive preference, and issues that stem from the inferred links between "resilience" and vulnerability, in C. Béné *et al.*, "Resilience: New Utopia or New Tyranny?", 2012.

87 Though the dilemma presented here is to a large extent intractable, questioning such assumptions (double-loop learning) would guard against this, to a degree.

88 C. Béné *et al.*, "Resilience: New Utopia or New Tyranny?", 2012.

89 C. Béné *et al.*, "Resilience: New Utopia or New Tyranny?", 2012.

90 Houiellebecq, 2017.

Understanding resilience as the outcome of the three capacities of Figure B1 means that "building resilience would require interventions that strengthen the three…*together*, and at multiple levels".[91] And **while resilience is not the goal of the operational resilience approach, operations that are more resilient are likely to increase the ability of the operations to help its beneficiaries cope, adapt and recover better**. As just one of many examples reviewed in Annex D, it is worth considering how the micro-grid project serves both the community and the income-generating ability of the utility in question.

B5 THE CHARACTERISTICS OF RESILIENCE

Several donor and development agencies have defined characteristics of resilience that help them work towards their objectives.[92] The World Bank developed a list of resilience indicators against which projects are evaluated, as shown in Table B.1.

ROBUSTNESS	integrity and strength of infrastructure and urban systems, including their reliability and ability to withstand shocks
INCLUSION	socially inclusive urban systems ensure that the most vulnerable people benefit equally from resilience activities
COORDINATION	between agencies, sectors and jurisdictions to plan, prepare and support integrated responses in the face of stresses and shocks
REFLECTIVENESS	systems that learn and evolve based on shared knowledge and experience
REDUNDANCY	alternate pathways within urban systems to manage resilience risks

Table B1 The World Bank's Resilience Indicators.[93]

The Rockefeller Foundation's Global Resilient Cities Network has its own expanded list of resilience qualities that are increasingly adapted by others to different contexts (including by the ICRC, in the concept note for the GRP), as shown in Table B.2.

91 C. Béné *et al.*, "Resilience: New Utopia or New Tyranny?", 2012.
92 See, for example, World Bank Group, ICRC and UNICEF, 2021.
93 World Bank, *Building Urban Resilience: An Evaluation of the World Bank Group's Evolving Experience (2007–17)*, Washington DC, 2019, p. 6.

INTEGRATED	Integration and alignment between city systems promote consistency in decision-making and ensures that all investments are mutually supportive to a common outcome. Integration is evident within and between resilient systems and across different scales of their operation. Exchange of information between systems enables them to function collectively and respond rapidly through shorter feedback loops throughout the city.
INCLUSIVE	Inclusion emphasizes the need for broad consultation and engagement of communities, including the most vulnerable groups. Addressing the shocks or stresses faced by one sector, location or community in isolation of others is anathema to the notion of resilience. An inclusive approach contributes to a sense of shared ownership or a joint vision to build city resilience.
REFLECTIVE	Reflective systems are accepting of the inherent and ever-increasing uncertainty and change in today's world. They have mechanisms to continuously evolve and will modify standards or norms based on emerging evidence, rather than seeking permanent solutions based on the status quo. As a result, people and organizations examine and systematically learn from their past experiences and leverage this learning to inform future decision-making.
RESOURCEFUL	Resourcefulness implies that people and organizations are able to rapidly find different ways to achieve their goals or meet their needs during a shock or when under stress. This may include investing in capacity to anticipate future conditions, set priorities, and respond, for example, by mobilizing and coordinating wider human, financial and physical resources. Resourcefulness is instrumental to a city's ability to restore functionality of critical systems, potentially under severely constrained conditions.
ROBUST	Robust systems include well-conceived, constructed and managed physical assets, so that they can withstand the impacts of hazard events without significant damage or loss of function. Robust design anticipates potential failures in systems, making provision to ensure failure is predictable, safe and not disproportionate to the cause. Over-reliance on a single asset, cascading failure and design thresholds that might lead to catastrophic collapse if exceeded are actively avoided.
REDUNDANT	Redundancy refers to spare capacity purposely created within systems so that they can accommodate disruption, extreme pressures or surges in demand. It includes diversity: the presence of multiple ways to achieve a given need or fulfil a particular function. Examples include distributed infrastructure networks and resource reserves. Redundancies should be intentional, cost-effective and prioritized at a city-wide scale, and should not be an externality of inefficient design.
FLEXIBLE	Flexibility implies that systems can change, evolve and adapt in response to changing circumstances. This may favour decentralized and modular approaches to infrastructure or ecosystem management. Flexibility can be achieved through the introduction of new knowledge and technologies, as needed. It also means considering and incorporating indigenous or traditional knowledge and practices in new ways.

Table B2 Resilience qualities of the Global Resilient Cities Network.[94]

These resilience qualities and indicators form the basis of the much wider protracted urban armed conflict characteristics tailored from the ICRC's experience, as presented in Section C2.

94 See Appendix G in ARUP and the Rockefeller Foundation, 2016.

ANNEX C

OPERATIONAL RESILIENCE IN GAZA

C1 THE GAZA RESILIENCE PROGRAMME

The logic of the multi-year GRP that was begun in 2020 is captured in Figure C.1. As the concept note developed for donors states, **the objective of the GRP is to strengthen "the capacity of affected communities and local service providers to withstand shocks and stresses and recover from them as quickly as possible"**.[95]

The projects intend to span emergency and development needs by maintaining minimum levels of essential services during a crisis; mitigating conflict-related effects on public health; and creating a more conducive environment for socio-economic recovery. The GRP is also organized to focus on four tracks that span well beyond the normal spectrum of any single ICRC unit: public utilities, communities, authoritative data and advocacy.

The concept note comments on the programme's theoretical basis, stating that it is "based on a System of Systems approach to infrastructure planning. Decisions are intended to be informed by combining a spatial database based on a GIS platform, a functional risk-based model of the local infrastructure system, and its interactions with the social, physical and political environment. The planning process is iteratively revised to ensure that the complex interconnections between systems elements are considered as they evolve."[96]

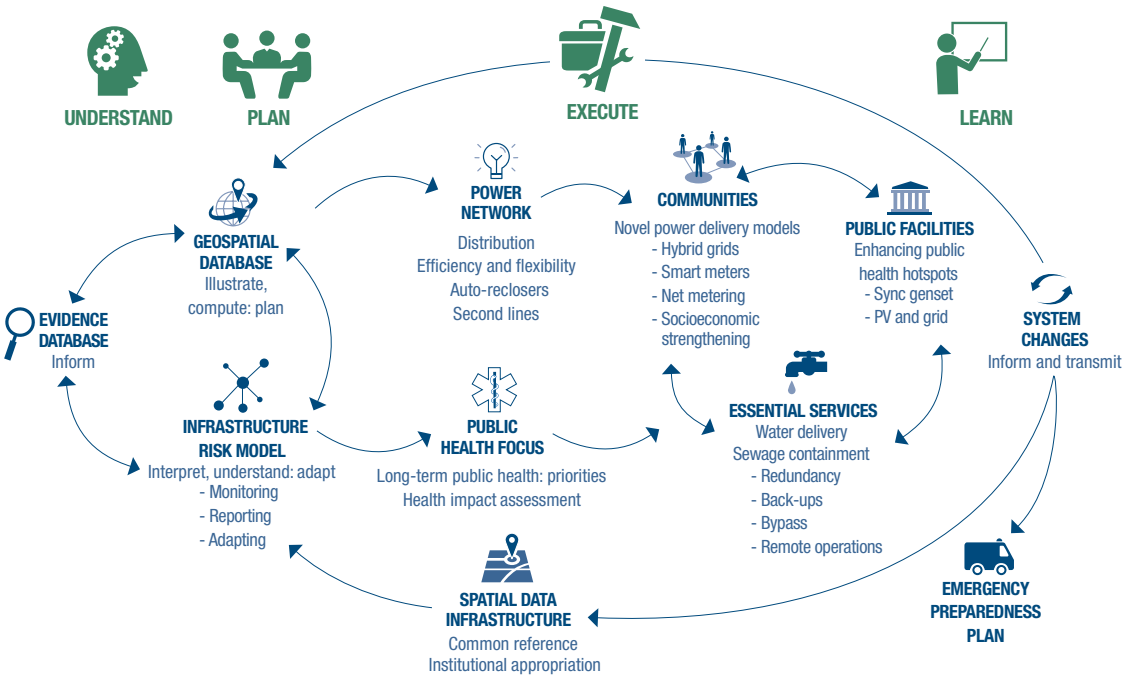

Figure C1 The programme logic of the GRP, overlaid with project cycle stages (at top, in blue).[97]

95 ICRC, Israel and the Occupied Territories, 2019.
96 *Ibid.*
97 *Ibid.*

Over five years, the GRP will work across public sector departments (health, water and electricity); across the ICRC (the Health, WatHab and EcoSec Units, and the Protection and Legal Divisions and the Communications Department); and with communities that benefit directly or indirectly. In order to implement the GRP, the Gaza subdelegation has dedicated the new posts of resilience project manager and resilience adviser to the existing team and is further planning to bring in additional expertise through consultants and to shore up procedures on monitoring and feedback loops. Monitoring is designed to occur at the micro-, macro- and meso-levels.[98]

The GRP has of course not yet been fully tested, but it is the result of a great number of completed projects from which lessons can be drawn. These projects are themselves the result of a sustained and demonstrable will to tackle the complexity of the challenge in Gaza through considerable thought and analysis.

C2 THE ROUTE TAKEN TOWARDS MORE EFFECTIVE HUMANITARIAN OPERATIONS IN GAZA

In terms of its length, breadth and level of engagement, the GRP is in many ways a first for the ICRC. Although the Geneva WatHab Unit did not conceive of the GRP per se when in 2013 it began its research for the Urban Services During Protracted Armed Conflict report (published in 2015), the report called for a "better approach" to assist people in protracted urban armed conflicts, setting in motion a series of analyses, reports and ideas that combined with events to lead to the GRP eight years later.

C2.1 STEPS FORWARD (ANALYSIS AND REPORTS)

In retrospect, the magnitude and intensity of the 2014 Israeli assault on Gaza required a sharper definition and operationalization of the better approach that was called for. At around this time, and with the help of discussions during the Resilience Assessment (see below), the WatHab engineers in Gaza sought to solve two conundrums: how to ensure a more reliable electricity supply for critical water and wastewater installations as well as hospitals when the official supply appeared capped at 50% of demand and all too often failed during hostilities; and how donors, development organizations and humanitarian organizations were fixated on building back as things were (i.e. rehabilitation and reconstruction work) after each of the previous rounds of hostilities (2008-2009, 2012 and 2014), an effort that did not strengthen the resilience of the service and hence created more vulnerability to the onset of a future hazard.[99] While the first conundrum is apparent to anyone new to the Gaza situation, it is one that typically slips away once work on traditional projects planned for in the PfR begins. The answer was eventually to be found through the *Electricity Sector Overview of the Gaza Strip*, which was conducted by the Gaza WatHab department in 2014 and was rather simple once spotted. The answer lay with the private electrical generators and other mechanisms that people and organizations had developed to cope (though there were relatively few of either at the time).[100]

At around the same time, the authorities' lack of preparedness for the 2014 assault on Gaza prompted the establishment of Gaza's multi-sector *Integrated Emergency Preparedness Plan* (EPP). This was developed and implemented with the Gaza electricity and water providers (GEDCo and CMWU) with the help of the energy and water regulators (PENRA and PWA). The EPP readied the service providers for the following crisis by pre-positioning stocks, improving communications and establishing procedures to protect staff. But the EPP did little to instil any form of resilience into either the services or the service providers themselves.[101]

98 *Ibid.*

99 Interview GVA 1.

100 As will be discussed, the off-grid solution was eventually to form first into projects to synchronize the timing of generators at hospitals and then hybrid electrical grids that make very efficient use of all sources available. This leads to a much more stable electricity supply and a higher bill collection rate for the operator.

101 Southern Harbour, *A Comprehensive Resilience Assessment*, 2018, and interviews GVA2, GVA3.

And it was within the (unexpected) absence of a full-scale crisis since 2014 that the answer to the second conundrum began to be formulated. The stability provided by outside assistance was also a source of weakness, because it left people in Gaza vulnerable to any sudden interruptions in assistance. The result was referred to as artificial stability by Southern Harbour, and revealed the benefits of reducing that vulnerability, just as the development organizations seek or sought to (see Annex B). The route followed to reduce vulnerability was to increase resilience, which led to the commissioning or development of several reports and pieces of analysis. Key among these were the *Gaza Resilience Assessment*, the *Coping Mechanisms Catalogue* and the HIA scoping study.

The Comprehensive Resilience Assessment of the Integrated Essential Services of the Gaza Strip (referred to in this document as the *Gaza Resilience Assessment or the Resilience Assessment*) was carried out by external consultant Southern Harbour in 2017. Following a system of systems and resilience evaluation of the EPP and a review of geospatial data, the *Resilience Assessment* made several sweeping recommendations. Considering water and electricity sectors in particular, the *Resilience Assessment* emphasized the importance of data reliability, harmonized geospatial databases and the development of a common understanding of the context and plan (what it refers to as a "common operating picture"[102]). Even more importantly, the *Resilience Assessment* made all involved challenge the assumptions that had been held throughout the ICRC's prolonged presence in Gaza and highlighted the great potential of the resilience approach, notably by building on the already noted capacity for response and self-recovery in many sectors throughout Gaza. The *Resilience Assessment* thus laid out the definition of operational resilience that was to be adopted by the ICRC: operational resilience is "that essential ability of an operation to respond to and absorb the effects of shocks and stresses and to recover as rapidly as possible normal capacity and efficiency".[103]

The push for resilience that followed the desire to resolve the second conundrum was reinforced by an ever-deeper level of understanding of the complexity of the challenge exposed by the *Resilience Assessment* through the summary mind map of dependent relationships shown in Figure C2. While people working in Gaza were of course aware of the numerous interdependencies that exist, the diagrams showed these interdependencies were even more extensive and interlinked than imagined. The diagrams showed issues as broad as the importance of maintaining refrigeration (the cold chain) for fish marketing promoted by EcoSec; the disabling effect of victim mentality; the importance of geo-referenced epidemiological studies; and the very little awareness of how people themselves coped.[104]

102 Southern Harbour, *A Comprehensive Resilience Assessment*, 2018.

103 *Ibid.*

104 More specifically, and as the figure states, the *Resilience Assessment* and map "provided ICRC with an understanding of the interconnectivity between systems and dependency chains: infrastructure and economics exist to enable healthier communities; essential services enable community and economy. When resilient, community clusters can still have services even when supply is shut down, as one cluster can compensate for another during stress and recover. The study also identified major gaps in our knowledge (baseline data) about the Gaza strip and that there remains a lack of tangible evidence regarding infrastructure (and other sectors) and needs: little about chronic diseases (the biggest threat to Gazan's health), link between water quality, food intake, drug intake and chronic disease; who are the most vulnerable in the various crisis and why (fuel crisis, power crisis, CoH, economic crisis, GRM crisis, medical crisis, the next crisis); real power demand of critical services: little about the capacity of community in Gaza coping mechanisms, formal or informal – to generate part of the services and add to the existing grids/networks".

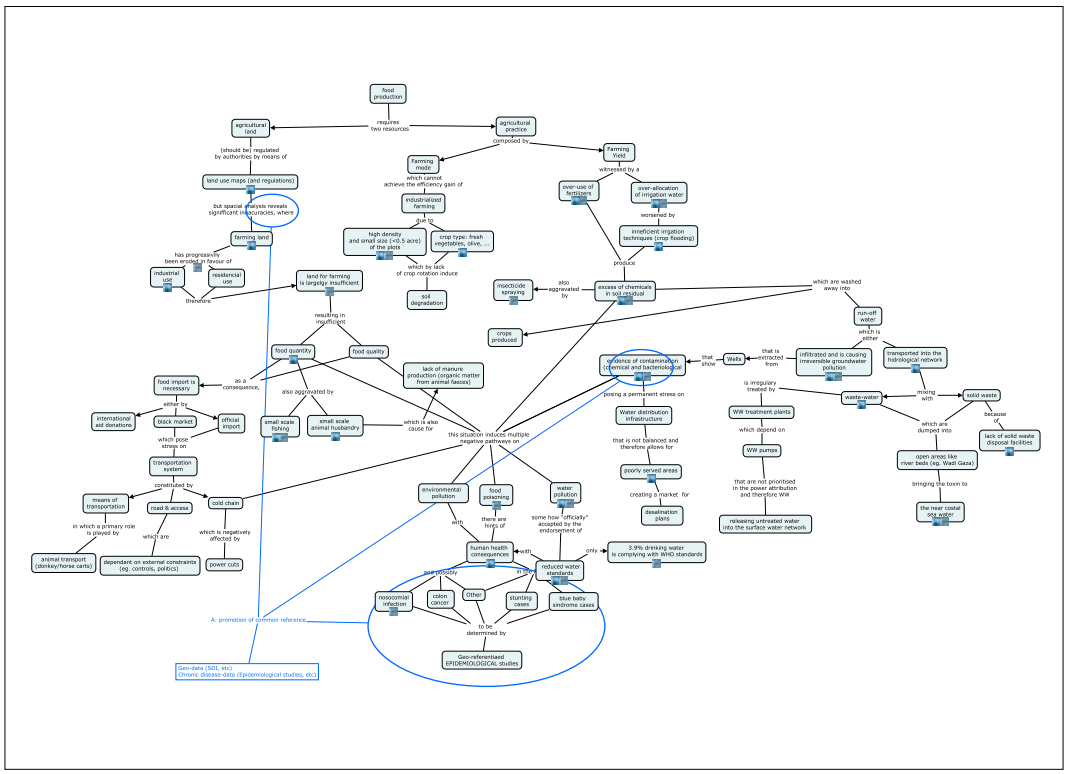

Figure C2 In a demonstration of triple-loop learning, this expanded mind map untangles many of the interdependencies of the water and wastewater sector in Gaza.

This gap in knowledge about people's coping mechanisms was filled by the second key document that led to the GRP: *Power systems: positive coping mechanisms in the Gaza Strip: – a (not-exhaustive) exploration and catalogue* (referred to in this document as the *Catalogue of Coping Mechanisms*). Started by the WatHab Gaza team in 2018 and still a live document, the effort revealed a great number of solutions that people had come up with to deal with the intermittent electricity supply. The efforts went beyond simple backup generators and rooftop solar heaters, which many people were aware of, to sophisticated electrical control switches purchased and installed by self-organized communities or particularly motivated individuals working for the electricity providers. The *Catalogue of Coping Mechanisms* is also credited for putting WatHab engineers in more direct contact with communities, which complemented the already very well-established and solid relationship with the service providers, and for leading to the innovative work on feed-in grids and community electrification reviewed in Chapter 5.

The third key document that led to the GRP is the *Health Impact Assessment of the Gaza Strip integrated essential services: Framing the process of HIA implementation and defining the next steps* (referred to in this document as the *Health Impact Assessment*, or HIA scoping study).[105] The HIA scoping study was initiated by the Swiss Tropical and Public Health Institute in June 2019 as recommended in the *Resilience Assessment*. Examining the interconnected sectors of energy, water, wastewater and food, the assessment revealed how little was known about the determinants of public health in Gaza in general and raised concerns related particularly to poor water quality and the spread of antimicrobial resistance beyond health-care facilities and the environment to the community. The focus on antimicrobial resistance has become a central component of the GRP for the ICRC's Health Unit and was planned even before the arrival of COVID-19.[106]

105 A similar key document is the internal document: ICRC, *Gaza Economic Analysis: A crisis of Hope*, 2017.

106 COVID-19 itself is very much like antimicrobial resistance in the sense that it is, thus far, a non-treatable pathogen.

The route to the GRP was also helped along by the institutionalization of the approach through the classic ICRC reporting and monitoring reports. The first resilience projects were included in the 2017 planning exercise, under the EPP, and have been anchored and built upon in subsequent internal planning exercises. Similarly, the 2018 white paper *Towards Resilience*[107] served to harmonize and consolidate the views between Gaza and Geneva on the path forward. Meanwhile the 2019 concept note *Towards (More) Resilience*[108] served to promote the ideas beyond WatHab and beyond the mission/delegation to the donor community, including SIDA.

C2.2 ENCOURAGEMENT AND RESISTANCE

It would be a mistake to think the journey of operational resilience in Gaza has been as straightforward as writing or commissioning a series of reports, however. Those who have embarked on the path have made missteps and been met with resistance of many different kinds and from many different quarters, all of which may serve as lessons to apply to deepening or spreading the approach, within Gaza or beyond.

It may not be possible to link inception of the idea of resilience to any single event or unit, but it is clear that it was developed jointly by WatHab in Geneva and WatHab in IL/OT. Inspired to provide a better approach following their own recommendations contained in the 2015 *Urban Services* report,[109] WatHab Geneva ensured that curious and innovative WatHab coordinators were put in place in IL/OT and in Gaza.

As most of the early internal ICRC correspondence reveals, the first attempts to redress the two conundrums (artificial stability in Gaza, and how to get more out of electricity into Gaza) were met largely with either glazed eyes or outright resistance. Simple messages encouraged some to consider long-term thinking, including "stop funding the status quo" and "throwing money at the problem is not the answer". But the level of attention quickly dipped when the assertions could not be backed up with an equally simple solution. By all accounts, the initial attempts to explain the new approach to complexity were far too complicated. Indeed, some of the mind maps and language developed during the process are of an intimidating scale (so much so that many WatHab staff did not engage).

Here the IL/OT communications unit and the head of delegation became the crucial first supporters of the idea (to return to the simple theory of change discussed in Section 3.1). Multiple discussions with the WatHab coordinator served to fine-tune the messages and create the space required to pursue the related solutions. With (initially very meagre) human and financial resources eventually secured through internal planning exercises, and with continuous support from the Urban Support Group in Geneva, the initial resilience project proposals were accepted and an evidence base began to form.

Indeed it was after seeing the results in action that several people on the WatHab team in Gaza became convinced of the approach.[110] Perhaps already persuaded by the long-term vision of the initiative, the evidence also clearly helped to bring several other ICRC departments on board. The Health Unit was keenly interested from the outset in the results of the far-sighted and ground-breaking HIA scoping study and mapped out the next steps forward. The EcoSec Unit was already inclined towards resilience, having undertaken the *Gaza Economic Analysis* in 2017 in order to broaden its operations, and it credits the operational resilience approach for helping them target both more broadly and more sharply.[111]

107 Internal document: ICRC, Towards [more] Resilience in the Gaza Strip, a systemic approach, Concept Note for a multi-year approach, August 2019 (201908 Concept Note_multi-year approach (with budget).pdf).
108 *Ibid.*
109 ICRC, *Urban services during protracted armed conflict*, 2015.
110 Interviews Gaza 1, Gaza 2, Gaza 3.
111 Interview IL/OT 7.

The importance of evidence is stressed here because it explains the emphasis placed both on the need of the GRP to prove success and on the role of monitoring the effectiveness of operations. The growing body of evidence and analysis of the secondary and tertiary spatial and temporal effects of explosive weapons on urban services (now more commonly referred to as reverberating effects[112]) has already served the Legal and Protection Divisions in their discussions with belligerents, albeit not without reservations.[113] By 2019 the data – along with the (by now) very much more finely tuned messages – also served to persuade potential donors.

Further resistance has originated from what several attribute to the ICRC emergency and silo culture (e.g. "WatHab repairs broken water pumps" and "Health does trauma care").[114] Internal correspondence reveals the WatHab coordinator's single-minded focus and will to confront this culture. Indeed, as recommended in Section 4.2, the importance of a champion is one of the key lessons to learn from the experience in Gaza.

The initial resistance of some of the beneficiaries was overcome in a much softer way: by matching interests. For example, WatHab engineers in Gaza were acutely aware that the electricity authorities must forgo their longer-term goals in order to reach their short-term goals (including existential ones such as surviving as an organization). The engineers in Gaza thus stressed (and were later able to prove) how projects such as feed-in tariffs and community electrification result in a higher rate of bill collection.[115] The very trusted long-term relationship that has been established with the electricity authorities also clearly helped in this regard.[116]

It would also be a mistake to think that the operational resilience approach has been fully taken up in Gaza. While the great majority of interviewees demonstrated their support for the operational resilience approach, it is apparent that there remains some resistance to it. And – crucially – only two of the people interviewed for this report fully understood the approach. Some interviewees saw the core of the operational resilience approach as sustainability achieved by working with communities; others thought it meant benefiting the service providers; yet others saw the operational resilience approach as promoting long-term or strategic thinking, beyond the annual cycle of internal planning exercises – which is a little closer but not the whole story.

112 ICRC, *Explosive Weapons in Populated Areas – Factsheet*, ICRC, Geneva, 2016; United Nations Institute for Disarmament Research, 2016; IRRC, 2017.
113 Interviews IL/OT 4, IL/OT 5.
114 Interviews IL/OT 7, IL/OT 9, GVA 1, Gaza 4, Gaza 5.
115 Interviews IL/OT 9, GVA 1, Gaza 1.
116 Interviews Partner 1, IL/OT 9, Gaza 5, Gaza 6.

C3 THE OPERATIONAL RESILIENCE APPROACH IN GAZA

Notwithstanding the lack of common understanding about the operational resilience approach, this section details the extent to which it was established in June 2020. Because the approach has not been recorded in a single document,[117] this section pulls together different features from several sources to examine each of the stages of the project cycle depicted in Figure 2.1 (Understanding, Planning, Executing and Learning).

It is helpful to recall at this point how protracted urban armed conflicts are characterized by very complex interdependencies between elements of society and services, and that the impact of armed conflict can be direct, indirect and cumulative. It is also worth bearing in mind the three capacities of resilience (capacity to cope, to adapt and to recover better) as well as several resilience characteristics (e.g. flexibility, inclusion and redundancy).

C3.1 UNDERSTANDING

The complexity of operations in Gaza has become understood to a degree through numerous sets of analysis and from many different angles, a selection of which are set out here. The *Resilience Assessment* examined in considerable detail issues as varied as social capital and infrastructure, producing a comprehensive assessment of geospatial capacities in Gaza. It showed, for example, how the geospatial databases of various service providers tracked the water distribution network differently (Figure C3), thus highlighting the importance of establishing a common database that everyone could draw upon.

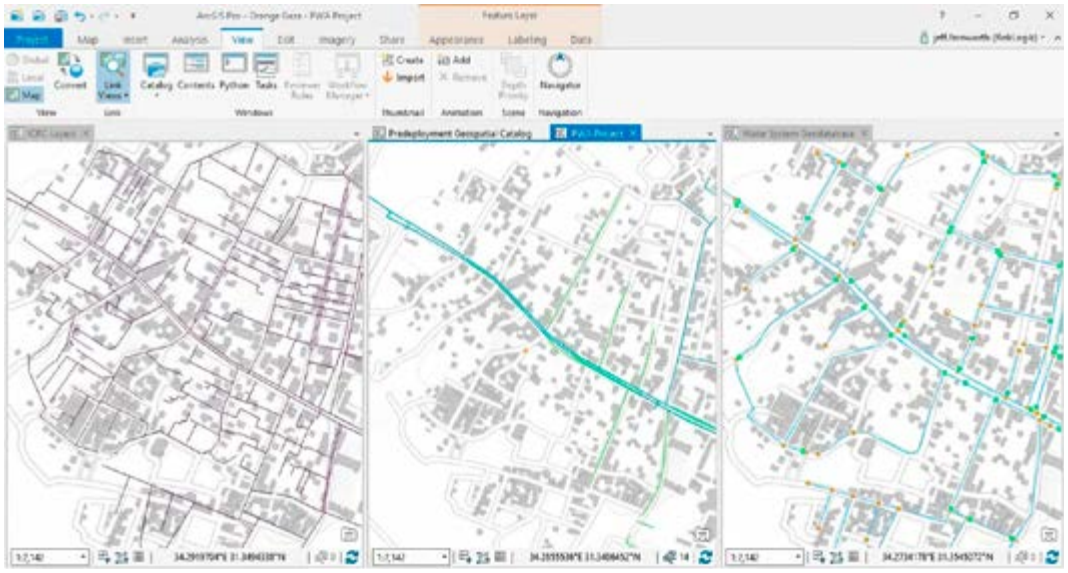

Figure C3 Three maps of the same water network, from three different geo-referenced databases. The differences between them highlights the importance of harmonizing the data and having a single database.[118]

Some of the findings of the *Resilience Assessment* were built into the previously discussed mind map developed for dependency chains (Figure 4.2) that highlighted how little was known about how people cope with the levels of service they have. For the Coping Mechanisms Catalogue, the WatHab engineers entered communities to explore how people coped with the very intermittent levels of electricity they were receiving. Exposing what is hidden in plain sight, the engineers categorized the mechanisms according to their provenance and their constituent parts (i.e. externally sourced, locally generated, controls, distribution and output)[119] – as seen in Figure C4.

117 The most complete capture of the process can be found in internal document: ICRC, *Synchronization_Smart Meters Technologies*, 2019 (2019 WatHab meeting - Synchronization_Smart Meters Technologies.pptx, slide 2).

118 Southern Harbour, *A Comprehensive Resilience Assessment*, 2018.

119 Internal document: ICRC, *Catalogue of Coping Mechanisms*, 2018 (Catalogue_Positive Coping Mechanisms Gaza.pptx).

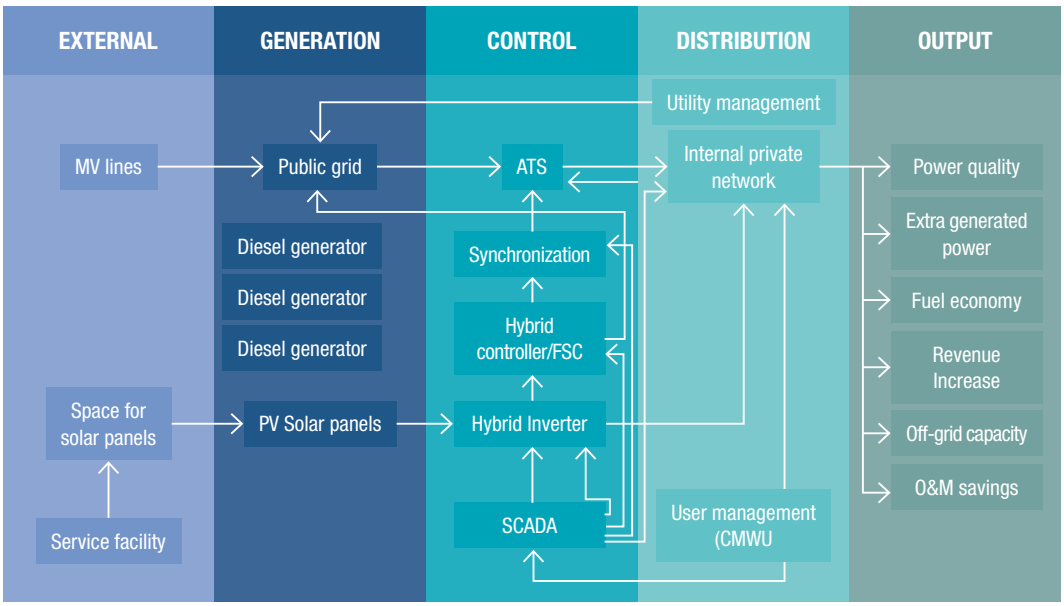

Figure C4 Analytical framework for the 2018 Catalogue of Coping Mechanisms (exemplified through the hybrid controller example).

The HIA scoping study was able to build on the Catalogue of Coping Mechanisms by contemplating the effects of the unreliable energy supply on various aspects of public health (among very many other issues discussed in Section C2)[120] – as seen in Figure C5.

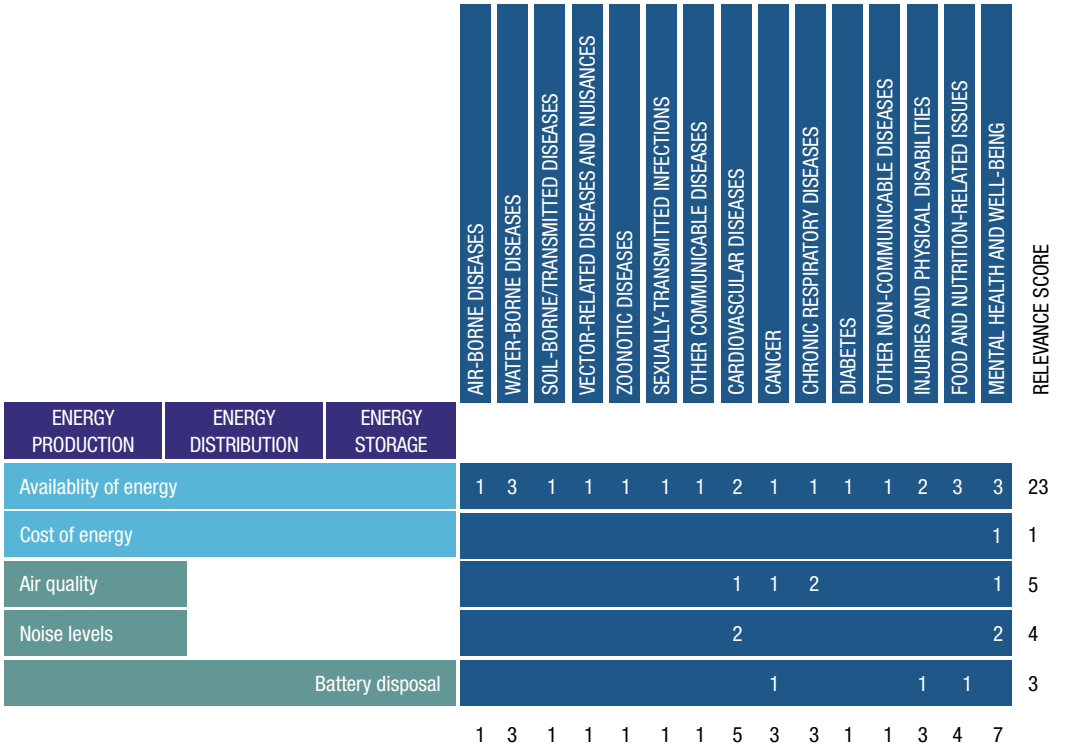

Figure C5 An example of the 2018 HIA scoping study's assessment of electricity-related health concerns.

120 Swiss Tropical and Public Health Institute, *Health impact assessment (HIA) scoping study of the Gaza Strip integrated essential services*, Swiss Tropical and Public Health Institute, 2019 (not published).

C3.2 PLANNING

Although the operational resilience approach intersects with the entire operations cycle, its crux lies in the design of operations, as shown in the project design guide shown in Figure C6.

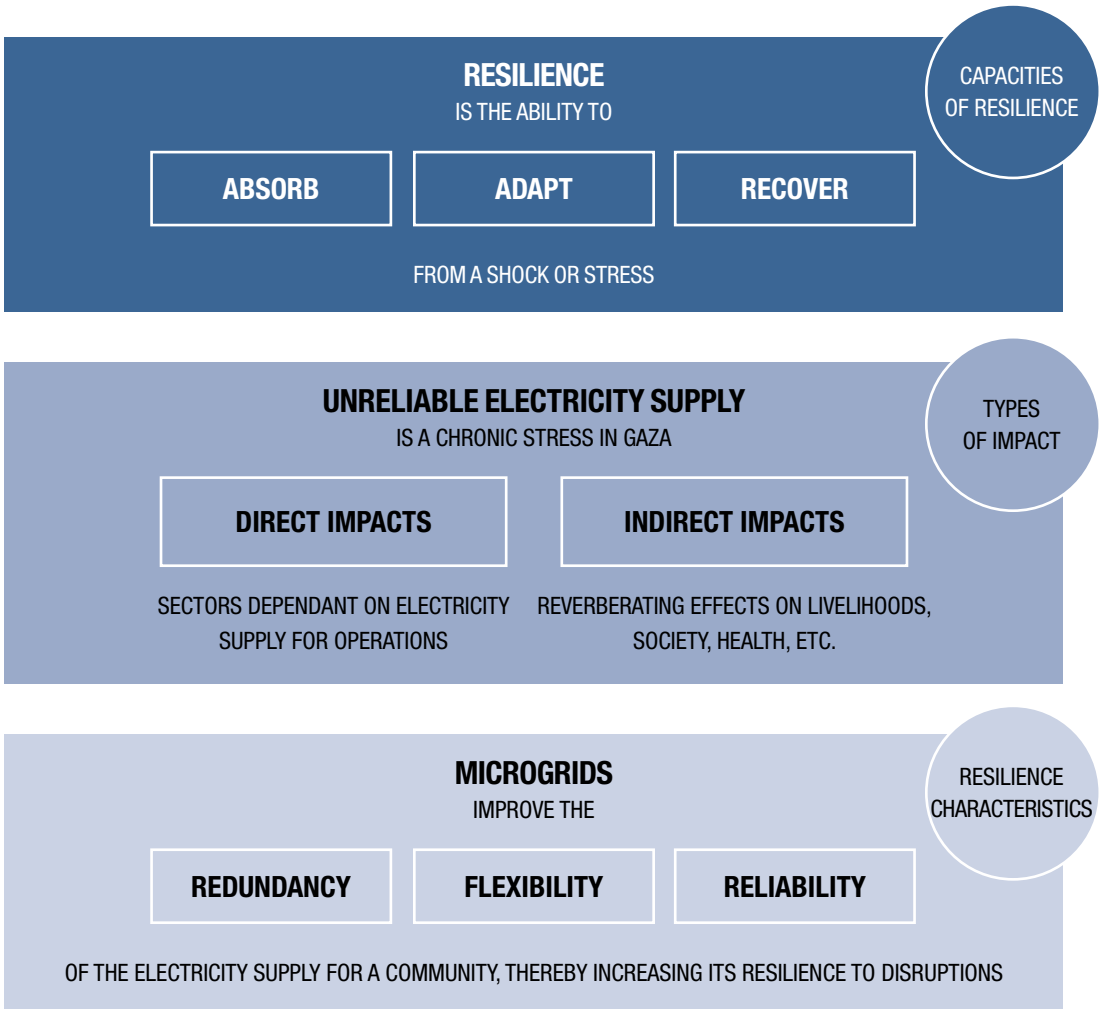

Figure C6 A guide for project selection and design, based on the operational resilience approach (for microgrids or feed-in tariffs). Relevant protracted urban armed conflict design characteristics are superimposed (on the right, in blue).[121]

The figure captures both the resilience and complexity of protracted urban armed conflicts – that is, the operational resilience approach – very neatly and serves as a useful template for developing an ICRC project proposal. The middle section reminds the project designer to search for ways to address the indirect (and not just the direct) impact of armed conflict on a variety of spheres. The top section guides the project designer to emphasize one or several of the three capacities of resilience. The bottom section emphasizes the three resilience characteristics that are most relevant to the case at hand, in order to guide the designer to maximize these to the extent possible.

C3.3 EXECUTING

For WatHab, the next steps form part of the project proposal process: technical assessment, development of terms of reference (TORs), and tendering/execution, but with an emphasis on working with the community and on feeding back into the analytical stage. The question of execution is not further elaborated in this report.

121 Internal document: ICRC, *Microgrid in Gaza*, 2019 (2019 WatHab meeting - MICROGRID IN GAZA.pptx).

C3.4 LEARNING

Compared to the extent to which the design and analysis aspects of the operational resilience approach have been developed, the monitoring that is so crucial to adaptive learning and continuous improvement is very much still a work in progress. As noted in the 2018 Monitoring for Results (MfR) for Gaza, the monitoring procedure for resilience projects has not yet been adequately established. Furthermore, the performance measurement framework linked to the 2020 internal planning exercise reveals dissonance between the far-sighted and interdependent nature of the objectives and the static nature of the indicators that are to be reported on – see Table C1.

OBJECTIVE	MEASURABLE
General objective: "Civilian residents of the Gaza Strip are protected against the major environmental health hazards related to essential services while strengthening their resilience to the effects of chronic difficulties as well as emergencies".	# of civilians in the Gaza Strip who have access to essential-service (water, wastewater, power and health) provision modalities that have one or more resilience mechanisms in place
Specific objective: "Beneficiaries have access to more reliable essential services, increasing their ability to respond to and absorb the effects of chronic difficulties as well as shocks and stresses, and to recover as rapidly as possible".	# of people who have access to an energy supply modality that has one or more resilient mechanisms in place
	# of people who have access to a water provision or/and wastewater collection and treatment modality that has one or more resilient mechanisms in place
	# of structures that have one or more resilient mechanisms in place to ensure the provision of essential services during normal times and emergencies
	# of service providers with an updated and improved GIS database
	# of official meetings and/or exchanges between the GIS officers of relevant authorities aimed at achieving a common GIS database
	# of documents related to the GRP shared with relevant stakeholders
	First phase of the awareness campaign, prepared to be launched at the end of 2020/early 2021

Table C1 Example of the mismatch between highly complex objectives and the quantitative indicators suggested to measure it, from the 2020 MfR for Gaza.

The measurables for the 2020 PfR/PMT have thus clearly not benefited from the work done on either broadening the definition of monitoring in order to match the general objectives (GOs) and specific objectives (SOs) or on feeding back to the analysis stage. The finding suggests that a more qualitative approach is necessary if even single-loop learning is to be achieved (see Figure 2.3).

122 Internal document: ICRC, *Outcome definition*, 2019 (PfR2020.docx).

One option proposed for monitoring and feedback is to evaluate each project according to seven resilience characteristics, as shown in Figure C7. The method is visually appealing but, as noted, remains largely descriptive and so may be more useful at the design stage than at the monitoring state.

COMPLIANCE TO RESILIENCE QUALITIES	INTEGRATED	INCLUSIVE	REFLECTIVE	RESOURCEFUL	ROBUST	REDUNDANT	FLEXIBLE
Epidemiological study HiA	■	■	■				
Spatial Data Infrastructure (SDI)	■	■	■			■	■
Population estimates	■	■	■				
Data collection LV lines	■	■	■				■
Auto reclosers (SCADA system)	■					■	■
Dedicated and 2nd power lines						■	■
Remote/automatic operation of water wells	■					■	■
Net meeting	■						
Smart meters	■	■					■
Synchronization of generator		■					■
Communities with private generator		■		■		■	■
Farming less water-demanding crops		■	■	■			
PV fishing boat ad cold cell		■		■			
Monitoring of water lines from Israel (MTAL)			■	■	■		
Reservoir bypass (MTAL proposal)					■	■	

Figure C7 Assessment of the compliance of resilience projects with resilience characteristics. More useful for classification than for design or feedback.

More creative attempts to improve learning attempt to turn the traditional method of identifying beneficiaries on its head. That is, rather than identify the number of people benefiting from a service or programme, the suggestion is to identify all those who are affected by its failure.[123,124] For WatHab, the efforts have led to an examination of the hazard footprints and severity assessment and of where geospatial analysis comes in handiest.

The steps WatHab has proposed to document the beneficiaries are shown in Figure C8, which leads from hazard footprints to a severity assessment.[125] To understand hazard footprints, consider the case of routine O&M work for a selected wastewater pumping station. Without routine O&M, any wastewater pumping station will fail, possibly resulting in raw wastewater seeping into the groundwater or bubbling up to flood the streets, thus exposing people to a severe public health risk. The people living in the vicinity of the pumping station, where the flooding would occur, would benefit from a successful O&M programme that prevented the breakdown in the first place.

The spatial extent of the flooded areas is referred to as the local hazard footprint, where the hazard refers to the exposure to the risk (people exposed to untreated wastewater), and footprint means the spatial area of the flood. In some situations, and as shown in the third frame of Figure C9, the breakdown of some pumping stations can have reverberating effects on other parts of the same wastewater situation. If a pumping station located upstream (see Section A1) is put under additional strain by the failure of the first, it too may eventually break down. If pumps downstream are allowed to run dry (because the pumps in question have not been supplying their source),

123 Another suggestion made during the interviews is to assess the benefits from the perspective of the partner organization. If GEDCo, for example, benefits from an improved public relations image arising from the (ICRC-assisted) improvements to the service, the anger of some of the protesters outside of its office will dissipate – and so should be counted (interview Gaza 1).

124 Internal document: ICRC, *Outcome definition*, 2019 (191029_GeoSpatialAnalysis_OutcomeDefinition. pptx, slide 50).

125 H. de Moel *et al.*, "Flood risk assessments at different spatial scales", Mitigation and Adaptation Strategies for Global Change, Vol. 20, May 2015, pp. 865–890.

they too will break down. As a result, the risk extends beyond the wastewater flood to another neighbourhood, creating what can more accurately be termed a real hazard footprint. Those who benefit from the prevention of the indirect impact are termed secondary beneficiaries. Yet the real hazard footprint can be, or become, much greater in size and in importance, such as if the pumping station creates problems that extend beyond the wastewater network to a hospital. The people who benefit from this component of an operation are referred to as tertiary beneficiaries. Here, the qualification of types of beneficiaries is more relevant than simply their numbers.

THE CASCADING EFFECTS OF FAILURE (OR REPAIR)

Identifying, Monitoring, Measuring Outcomes

O&M works in one wastewater pumping station

1. Identify network components upstream (this pumping station receives wastewater from there too)
2. Extract this geological area
3. The number of people living in this area

What if the pumping station fails? Local hazard footprint

Sewage will overflow

1. Calculate amount of sewage at risk of flooding
2. Identify the area at risk of flooding
3. Identify the number of people that could be affected

Will the failure affect the wastewater network upstream and downstream? Real hazard footprint

More sewage will overflow

1. Identify the wastewater network components upstream and downstream that will stop working if the pumping station fails
2. Identify the area at risk of flooding (take into consideration topography, for downstream overflow)
3. Identify the number of people that could be affected by sewage overflow at the site, upstream and downstream

Which other systems might be affected/fail if the pumping station fails?

Sewage overflow affects other systems

1. Failure of the wastewater pumping station produces overflow where other systems operate. Identify components of those systems: e.g. clinics, schools, roads and the sea (runoff pathway to final discharge)
2. Identify the geographical area at risk (catchment area of the clinics and schools, fishing zone, etc.)
3. Identify the number of people that could be affected by the failure of this pumping station across systems

Output: what is produced (e.g. more electricity)

Outcome: level of performance of what is produced (e.g. How much more electricity? How many more people have access to it? Number of hours that shops are open?)

Impact: the broader changes that occur within the community or environment as a result of the outcomes (e.g. Have there been economic improvements? Have there been health improvements?)

Figure C9 Local and real hazard footprints: a better way to identify, monitor and measure outcomes of resilience projects than Figure 4.8.

The proposed method to assess severity is shown in Table C2. This links the severity of any hazard to its footprint, rating it in terms of both duration (long-term, short-term) and degree (low, medium or high). With the monitoring of resilience projects and the ongoing GRP still being developed, one route forward would be to combine the hazard-footprint (Figure C9) and severity-assessment approach (Table C2), align it more with the ARUP/Rockefeller Foundation's resilience qualities (Table B2), and simplify it or generalize it in a way that works as well for other units as it does for WatHab (which is in essence captured by the protracted conflict operations cycle set out in Chapter 2).

Formulating outcomes*

The primary outcome is shown in the first line of the table. The other lines illustrate the negative outcomes that were avoided (secondary outcomes) by reducing the likelihood of failure.

N.B. This table can serve as a template for a similar analysis. The *severity* index is a first attempt to bring into the analysis the consideration that not all consequences are the same. The rating is obtained by cross-referencing the short-, medium- and long-term scale of the outcome against its low, medium or high intensity.

HAZARD FOOTPRINT	HAZARD	INTERSECTION OF HAZARD AND INFRASTRUCTURE ASSETS	PEOPLE AFFECTED	DEGREE OF DAMAGE	SEVERITY
Upstream catchment area	The upstream catchment area feeds into the pumping station as designed, under normal operations.	No effect	Upstream catchment area served by wastewater network	The pumping station is operating as designed so there is very little risk to anyone in the catchment area	
Flooded area	The area adjacent to the wastewater pumping station is at risk from sewage flooding. This has could have knock-on effects on critical local infrastructure.	Desalination plant	People using dealinated water	Lack of water, other sources are available in the short-term, but may be different quality and cost	SHORT / MEDIUM
		School	1. Students at school 2. Those using school as a shelter	1. Number of students 2. Estimated shelter use	MEDIUM / LOW
		Commercial markets	1. Businesses selling products on site 2. People buying food and other goods	1. High impact on businesses if flooding lasts more than several days; unlikely to reopen 2. Localized flooding means people can buy food at other markets; the impact is low	SHORT / LOW
		Health facilities	1. Those requiring access to hospital 2. If health facility is flooded and evacuation required - inpatients needing transferred	High impact if people cannot access a health facility - increases traffic at others in the area (if there are others in the area)	SHORT / HIGH
		Habitat	Types of habitat, i.e. refugee camp, high-rise apartment	1. Low-level temporary dwellings will have a high degree of damage 2. High-rise buildings will be relatively unaffected	SHORT / HIGH
		Water supply facilities	1. Those exposed to well contamination 2. Those exposed to water supply pipe contamination 3. Those exposed to pumping station or other assets affected	1. Contamination of wells and supply pipes is a high risk; long-term issue affecting every person with access to that water 2. Failure of pumping station and other assets will cut off water to people in the catchment area	LONG / HIGH SHORT / HIGH
		Fuel deposit	People reliant on that fuel source	Heating and power as well as transport; however, unlikely to be the only source, so degree is low	SHORT / LOW
Upstream catchment area	The upstream catchment area is not affected by pump failure, and people will continue to be able to use the system as normal.	No effect	People will not be affected and will continue to contribute to the waste network	Low	
Critical downstream elements	The connected downstream assets will receive less flow but may not be shut off.	Water treatment plant has reduced efficiency	Operators affected	Very low	MEDIUM / LOW
Environment (surface drainage and discharge at sea)	As the wastewater pumps fail and the local area floods, there will be a wider environmental impact as surface run-off and waterways are contaminated with sewage. This effect may last longer than the initial localized flooding as the sewage disperses and the water level declines.	Contaminated surface run-off and waterways	People living close to waterways or exposed to surface run-off	Likely to be less aware of the contamination than those in the immediate flooded area, less behaviour change expected; so while overall risks are lower in the short-term, there may be hazardous exposure over the long-term	LONG / LOW
Food chain	In terms of environmental pollution, one example of a longer-term effect would be as contaminants reach the sea and agricultural land, potentially affecting the food chain.	Contaminants entering the soil or sea, with an impact earlier in the food chain	1. All people who eat food such as fish from contaminated waters or crops grown in contaminated soil 2. Those working in these industries, i.e. farmers and fishermen	Depends on how concentrated the contaminants are, but there is the potential for cumulative effects	LONG / LOW

* R. Pant, S. Thacker, J.W. Hall, "Critical infrastructure impact assessment due to flood exposure, Journal of Flood Risk Management, Vol. 11, p. 22–33. 2018.

Table C2 A simple severity assessment: one method proposed to identify the outcomes of resilience projects. [126]

126 Internal document: ICRC, *Workshop_Urban Program Outcome Identification*, 2019 (1911_GISWorkshop_Urban Program Outcome Identification.pptx, slide 49).

C4 FACILITATING AND IMPEDING THE OPERATIONAL RESILIENCE APPROACH

C4.1 WHAT FACILITATES THE OPERATIONAL RESILIENCE APPROACH

The documents and interviews confirm that, first and foremost, uptake of the operational resilience approach requires a champion to promote it from within the delegation/mission, such as the WatHab coordinators in Gaza. Without a point person ready to find creative ways to overcome the expected resistance, nothing will change. However, change is facilitated by the first supporters – such as the head of mission, communications coordinator, head of delegation and head of subdelegation in Gaza – who are willing to take risks to promote the new approach.[127] Similarly, support from the Urban Group in Geneva is also key, for it can provide the necessary encouragement, expertise, resources and guidance[128] (which is in effect a form of redundancy in the protracted conflict operations cycle approach of Section 2).

The champions of the operational resilience approach in IL/OT are also quick to point out that the adoption of the operational resilience approach requires considerable patience and time. With patience and time, opportunities that present themselves over the years (such as unexpected periods of calm, and growing donor fatigue in Gaza) may be seized to promote the operational resilience approach.

The experience in Gaza also shows that innovation is more feasible under specific staffing conditions. Technically competent and open-minded delegation staff, for example, make it possible to address the complexity of protracted urban armed conflicts. It also helps if the ICRC's partners trust it and are generally open-minded and competent – as they are in Gaza. The operational resilience approach is also more likely to succeed if there are long-serving delegation staff and if delegate assignments are longer than usual (i.e. at least two to three years). Each of these factors is likely to have helped secure the funding for the GRP and will determine the success of this approach in the future. Such earmarked funding will ensure uptake of the operational resilience approach, not least through the two dedicated job positions (the resilience adviser and resilience coordinator).

Fortunately, many of the procedures that are being developed to implement operational resilience may be readily absorbed into existing ICRC reporting and project development structures. The problem analysis section of the project proposal document, for example, has already been used to incorporate terms and concepts like interdependencies and resilience, suggesting that established procedures need not be completely overhauled.

C4.2 WHAT IMPEDES THE OPERATIONAL RESILIENCE APPROACH

Bearing the specificity of Gaza in mind, there are a number of factors that are expected to discourage uptake of the operational resilience approach in other operational situations. Perhaps the biggest factor challenging the operational resilience approach is the clash between the most immediate needs and longer-term plans of the ICRC's partners. Considering the dire economic situation in Gaza, it is both understandable and predictable that the water and electricity providers prioritize their own institutional survival (through activities that improve bill collection rates), for example, rather than more experimental or less-tested projects.[129] The solution proposed for this clash of interests is to design operations that satisfy the interests of the various parties (the win-win-win approach discussed in Section 3.3). Aligning interests is not always possible in practice, however, and the lingering tensions will likely always have to be managed where they cannot be resolved.

127 Interviews IL/OT 9, GVA 1.
128 Interviews IL/OT 9, GVA 1.
129 Interviews IL/OT 2, IL/OT 8, Gaza 3, Gaza 4, Gaza 5.

One of the most loudly voiced criticisms was that the operational resilience approach is very difficult to understand. Most staff interviewed saw the approach, or parts of it, as unnecessarily complicated. More effective ways to communicate the approach and its benefits must be found (see, for example, Section C2), and the future role of communications remains crucial. Standardizing procedures (as suggested through the protracted conflict operations cycle discussed in Chapter 2) will also help in this regard.

Scepticism about the utility of the operational resilience approach also poses an obstacle for its uptake.[130] Staff who are reluctant to change their behaviour will be even more resistant if they cannot foresee the benefits of the change. As discussed earlier, the evidence collected and fed back into the approach will help in that regard and in developing the learning culture required to manage complexity.

Indeed, several aspects of the prevailing ICRC culture delayed the innovation required for more effective humanitarian operations in protracted urban armed conflicts (e.g. its ability to achieve a sustainable humanitarian impact). Seen very much as entrenched in an emergency mindset and as operating in silos,[131] the ICRC is also weak on long-term planning and on consulting and working with communities.[132] As one senior manager stated, "we've all grown up in the ICRC…so we see everything through the ICRC lens." Here again, evidence can help shift mindsets, but not everybody will always be supportive. In the end, those who seek to address complexity will have to continue to expect resistance or reluctance.

Resistance to the operational resilience approach may be exacerbated by the considerable human resources and effort required, particularly when there are no immediate or tangible benefits.[133] The explorative manner of the operational resilience approach means that results and failures take considerable time to materialize. Supporters of the approach can thus get lost along the way.[134] This is particularly the case considering the clash with the ICRC's established one-year programme cycles and classic reporting/monitoring tools (notwithstanding the organization's ability to adapt to the new terminology, as previously noted).[135] EcoSec may have shown the way forward here by anchoring long-term goals in double GOs and multi-year GOs (and short-term goals in SOs).[136]

130 Interviews IL/OT 8, GVA 1, Gaza 3, Gaza 5.
131 Interviews IL/OT 7, GVA 1, Gaza 4, Gaza 5.
132 Interview Gaza 5.
133 Interviews IL/OT 1, IL/OT 5, IL/OT 7.
134 Interviews IL/OT 1, IL/OT 7, IL/OT 9, Gaza 4.
135 Interviews IL/OT 2, IL/OT 7.
136 Interview IL/OT 7.

ANNEX D

RESILIENCE PROJECTS IN GAZA

This chapter documents selected projects that have evolved out of the operational resilience approach in Gaza, at different time periods and at different scales. The so-called resilience projects are assessed with a view to drawing out lessons that may help define an approach that would be more broadly useful to the ICRC (see Chapter 7).

D1 DESIGN CHARACTERISTICS FOR OPERATIONS IN PROTRACTED URBAN ARMED CONFLICTS

Documentation of the resilience projects in this chapter reveals a very wide variety of issues, principles and ideas that are relevant to protracted urban armed conflict. Table D1 summarizes these and adds them to the resilience characteristics reviewed in Section B5, while also further separating them into essential and desirable categories. The result is protracted urban armed conflict design characteristics that are then used to document the projects.

DESIGN CHARACTERISTICS	OPERATIONS ARE DESIGNED TO …
ESSENTIAL	
Far-sighted	…target medium- and long-term objectives, in addition to short-term objectives
Broadly targeted	…target secondary and tertiary beneficiaries, in addition to direct beneficiaries
Impact-focused	…address the indirect and cumulative impact, in addition to the direct impact
Interdependent	…build on existing interdependencies between sectors and systems
Inclusive	…maximize the involvement of communities, local authorities and other ICRC units
Redundant	…ensure spare capacity and components are available
Integrated	…align with existing plans, decision-making processes and interests
Flexible	…be able to adopt alternative strategies to achieve the same objectives under different circumstances
DESIRABLE	
Empowering	…help local actors to take the lead on their own initiatives to cope, adapt and recover better
Rapid	…achieve objectives in a timely manner in order to contain losses and avoid future disruption
Reliable	…ensure consistent performance in terms of quality and quantity
Robust	…withstand the impact of hazards without significant damage or loss of function

Table D1 Protracted urban armed conflict design characteristics (long list). The short list of these captures the essential characteristics (see Table 2.1).[137]

137 Based on analysis in the text and the following works: ICRC, *Urban services during protracted armed conflict*, 2015; ARUP and the Rockefeller Foundation, 2016; Houiellebecq, 2017; and ICRC, *Israel and the Occupied Territories*, 2019.

D2 DESIGN PROFILES OF SEVERAL DIFFERENT RESILIENCE PROJECTS

This section profiles the design of several different resilience projects that have been implemented in Gaza, using the protracted urban armed conflict design characteristics shown in Table D1. Bearing in mind that the goal of the operational resilience approach is to pave the way for more effective humanitarian operations in situations of protracted urban armed conflicts, we recall that operational resilience in and of itself is not the goal. The profiles in Table D2 thus provide an indication of the extent to which operational resilience guided the projects (whether at the design, analytical, execution or feedback stage), and in no way suggests the projects are being evaluated as resilient or not.

		ESSENTIAL							DESIRABLE			
PROJECT	FAR-SIGHTED	BROADLY TARGETED	IMPACT-FOCUSED	INTERDEPENDENT	INCLUSIVE	REDUNDANT	INTEGRATED	FLEXIBLE	EMPOWERING	RAPID	RLIABLE	ROBUST
Dedicated and second power lines	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
Remote operation (wells, generators, etc.)	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	N
Auto-reclosers	Y	Y	N	N	N	Y	Y	Y	N	Y	Y	N
Synchronization of generators*	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	N
Solar feed-in/net metering*	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	N
Electrical load management/smart meters*	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N
Hybrid grid/community electrification	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
*HIA scoping study	Y	Y	Y	Y	Y	Y	Y	Y	N/A	N/A	N/A	N/A

*Denotes projects reviewed in greater detail in this chapter.

Table D2 Profiles of the selected resilience projects versus the protracted urban armed conflict design characteristics of Table 5.1.

Several notable trends are revealed by Table D2. For example, very few of the projects are robust in the sense that they can withstand the direct impact and reverberating effects of armed conflict by themselves. If dedicated power lines are buried deep enough and covered in concrete, they may be slightly more robust than exposed installations, but it is otherwise impractical to expect any project to be robust against the intensity of modern weaponry (such as the attacks experienced in Gaza). The community electrification and load management projects appear to be of sufficiently large technical and temporal scale that they were designed from the outset to be continually improved. Many of the other projects are smaller and perhaps not as innovative (even if they are very effective). This suggests that whatever is learned by those projects may stay with the managers who are responsible for them and not contribute to the wider body of knowledge about the operational resilience approach (noted as a key lesson learned in Section 3).

By contrast, most of the projects can be considered flexible, in the sense that they allow alternative ways of achieving the same objectives. The simple technology of auto-reclosers (which allow certain aspects of the electrical network to be isolated) allows alternative routes for electricity to reach the same destination, for example. The community electrification and load management projects are flexible in a whole other manner, as their sophisticated central command devices (SCADA) can be readily re-programmed to meet the demands of very different situations. All of the projects involve some form of redundancy, furthermore, whether it is a second and third source of electricity, or multiple ways to operate a water pump. While systems redundancies can be seen as inefficient and a waste of resources in some systems, the quality and idea of redundancy appear so suited to the protracted urban armed conflict of Gaza that it is considered a core characteristic. All of the projects are "far-targeted", furthermore, in the sense that they set objectives in the medium- or longer-term (as well as the short-term). And each project accounts for the complexity of protracted urban armed conflicts in the sense that they make the most of interdependencies (of water, electricity and health, for example). Each involves a minimum of two partners (e.g. the electricity provider and the community), while some span ICRC units (e.g. WatHab and Health). Most also target secondary and tertiary beneficiaries, as well as the direct beneficiaries that are usually targeted in typical emergency-type operations (see Section 2.3).

On the whole, Table D.2 thus reveals that encouraging steps are being taken towards more effective humanitarian operations in protracted urban armed conflicts. But this method can provide at best an indication of what we can learn from the projects, and so four of the projects are examined in slightly more detail below.

D3 BRIEF STUDY OF THE SYNCHRONIZATION OF GENERATORS AT AL NASSER MEDICAL COMPLEX

The challenge: Al Nasser Medical Complex in Khan Younis (southern Gaza) played a crucial emergency role during the 2014 assault on Gaza. The complex is composed of three separate hospitals, each of which was equipped with one or two large backup electrical generators that ensured they could provide electricity for essential services even during the scheduled or unexpected electrical power shortages.

A typical response: The typical emergency response to this challenge would be to supply fuel for each of the generators and key spare parts that would help with maintenance. The ICRC was in fact doing precisely this for other hospitals, and for the Ministry of Health. But operating and maintaining electrical generators requires considerable time, fuel and money.

The project and process: The WatHab engineer tasked with supporting the complex was encouraged to think in terms of reliability, redundancy and flexibility.[138] Before proposing a project, he therefore first considered the demand for electricity, that is, how much is needed by whom and when. This approach led to the discovery that, outside of working hours and on holidays, each generator was far over-sized for the load created by the buildings they supported. Prolonged operation below the minimum capacity led to predictable damage to the generators. Thanks to the electricity provided intermittently by GEDCo, and to the World Health Organization and World Bank supported plans for solar power, the hospital complex actually had surplus electrical power at certain times.

Once implemented, the proposed project optimized and coordinated all of the sources of electricity (primarily through the installation of synchronization panels, which allowed one power source or a combination of power sources to be operated, depending on the demand for power).[139] The efforts led first and foremost to a more reliable supply across all three hospitals. But it is also expected to

138 Interview Gaza 1.

139 Interview Gaza 2 and internal document: ICRC, *Synchronization Generators Nasser Hospital Project Proposal*, 2018 (MoH Synchronization Nasser Hospital PP.docx).

have resulted in: preserving and extending the life of each generator; automatic operations, which reduce the risk of injury of maintenance crews during the CoH; savings to the hospitals in terms of fuel costs; the hospital being able to absorb emergency-related shocks (e.g. surges in demand) and adapt its services for an increase (or decrease) in demand, as required; and electricity from the backup generators being used to power non-essential services (such as night lighting) that had previously remained unpowered. This activity required expertise in electrical engineering and considerable coordination between the hospital directors, electricity providers, other donors and the Israeli authorities (to allow the entry of specialty parts into Gaza).

More effective programming in protracted urban armed conflicts? The resilience thinking behind this project led to the coordination of all the sources of electricity. The hospital complex's electrical system now has built-in redundancies, meaning that even if one of the power supplies is cut, the hospitals will not lose all power. The project is flexible in the sense that if one part of the complex requires more electricity, the providers can readily source it from other parts. It is reliable in the sense that all essential hospital services (and then some) are supplied with power and are likely to continue to be even during the CoH. The complex's power system, which has been functioning steadily since December 2019, is also considerably better in every way than it would have been if only more fuel and parts were supplied. The project is also far-sighted and inclusive for the way in which it brought hospital directors and electricity authorities together. Thus the operational resilience approach has served the goal of achieving more effective humanitarian operations in protracted urban armed conflicts.

Lessons: This project was analysis-heavy but infrastructure-light. Its success is based on the technical expertise of the staff involved, the willingness of all parties to cooperate, the relatively good state of existing infrastructure and the ability of the project designer to think before acting. Arguably, it has helped the directors of the hospitals move from simply being able to cope with a situation to adapting rather well to it through the reliability, flexibility and redundancy it provides. While the extent and types of beneficiaries may not have been robustly documented, the lessons learned have been integrated into the design of ongoing projects. There may also be room to improve the analysis (and perhaps the project design itself) if the project partners were mapped out in a more analytical manner than they were in the project proposal.

D4 BRIEF STUDY OF THE SOLAR FEED-IN PROJECT (NET METERING AT CANADA WELL)

The Challenge: The so-called Canada Well is a key source of domestic water for Rafah (southern Gaza), but, like the Al Nasser Medical Complex, suffers from a wholly unreliable supply of electrical power. The pumps have a backup generator, but maintaining both the pumps and the generator puts the safety of the CMWU crews at risk during the CoH. As a result of the poor quality of the water supply, people install household-level under-the-sink desalination filters to treat salty groundwater from local wells, purchase water from local desalination plants, and/or purchase bottled water.[140]

A typical response: The typical emergency response to the challenge would be to supply additional generators and key spare parts that would help with maintenance, as the ICRC was already doing in support of the water provider (CMWU) and regulator (PWA). But operating and maintaining electrical generators requires a lot of time, fuel and money and would not reduce the risk of injury to maintenance crews during the CoH.

The project and process: The project installed a hybrid solar power generator to operate the well pumps and booster pumps, installed a dedicated (buried) power line from the public electrical grid, and implemented a method to operate both at the same time and remotely. According to the engineer tasked with addressing the challenge, the electrical and water providers were reluctant to engage at

140 Internal document: ICRC, CMWU *Net-metering Canada Water Well Project Proposal*, 2018 (CMWU Net-metering Canada Water Well PP.docx).

first, but stepped up to lead the project design and propose the project components themselves – a factor that she is certain contributes to their sense of ownership of the project.[141] She also credits the problem analysis carried out as part the project proposal for forcing her to think outside the box and in the long term. Convinced that the redundancy of the dedicated power line and the additional source of electricity might lead to more people having more water, she now considers the project to be useful during both hostilities and non-emergency periods.[142]

The installations have led to reductions in the fuel required to run the well, reined in the exposure of maintenance crews during the CoH and increased the reliability of the electrical supply to the well.[143] The latter benefit depends on the extent to which the solar power portion of the well complex can itself feed into the electrical power grid when not in use, thus providing additional electrical capacity (through exchange) to the water provider.[144] The project also led to a contract with a private company (Schneider Electric) to provide additional technical competencies that are not available in-house. This furthered the learning loops and took the project further along the protracted conflict operations cycle.

More effective programming in protracted urban armed conflicts? The resilience thinking behind the project is apparent through the redundancy of a second line along with the flexibility and reliability that come from having alternative sources. While the project provides an expanded and more secure water source to primary beneficiaries, it also benefits the water and electricity providers as secondary beneficiaries. Although they have not been tested during hostilities, the project components are likely to serve during emergencies as well as they do during non-emergency periods. The interdependencies of the electrical and water sectors were also leveraged, and providers from both sectors were involved from the outset.

Lessons: This project was very heavy on analysis. It would not have worked without the technical expertise of the staff involved (who through foresight were able to spot the opportunities), the willingness of all parties to cooperate, the relatively good state of existing infrastructure (especially SCADA centres, for example), and the willingness and ability of the project designer to think and consult others before acting.

While the installations have certainly helped the water and electrical providers move from barely coping to adapting, the extent and types of benefits of this project are being documented. The effect it has had on the coping mechanisms that the people had developed for their domestic water supply remains unknown, for example. Likewise, the benefits and use of the additional electricity fed into the grid remain unknown. There is also likely room to improve the analysis (and perhaps the project design) if the partners were mapped out in a more analytical manner than they are in the project proposal. On the other hand, the problem analysis part of the project proposal has proved able to incorporate terms and concepts like interdependencies and resilience, suggesting that established procedures do not need to be completely revised.

141 Interviews Gaza 3, Partner 1.
142 Interview Gaza 3.
143 Internal document: ICRC, *CMWU Net-metering Canada Water Well Monitoring report*, 2020 (200630_Net-metering Report -Dec 2019 - April 2020.docx).
144 Internal document: ICRC, *CMWU Net-metering Canada Water Well Project Proposal*, 2018 (CMWU Net-metering Canada Water Well PP.docx).

D5 BRIEF STUDY OF THE ELECTRICAL LOAD MANAGEMENT PROJECT (SMART METERS IN AL KARAMA)

The Challenge: The people and all sectors in Gaza continue to suffer from having roughly only 50% of the electrical power they need, and no increase in the overall amount of electricity supplied to or produced in Gaza is expected anytime soon. Any additional electricity produced or "found" through the more efficient use of what is available will contribute indirectly to beneficiaries throughout Gaza.

A typical response: The ICRC does not typically address challenges of this type and scale, which are usually considered better left to the master plans of the authorities or development organizations.

The project and process: Building on an initiative started by the electricity provider (GEDCo), the ICRC implemented a pilot project in 2018–19 to install over 470 smart electricity meters in individual households of an apartment block in northern Gaza (Al Karama Towers). Smart meters are a relatively new technology that allow for the remote control of electricity use and the measurement of electricity consumption, and which can be programmed to align with the power schedule set by the provider. Since demand for power varies among users,[145] smart meters can ensure that the total electricity load demanded by the apartment block is spread in a way that takes electricity from households where it is not needed and sends it to households where it is needed. This activity is referred to as electrical load management.[146]

The project takes the logic of the Synchronisation of Generators project (not discussed in this report), to another level. In order to define and then achieve the potential benefits of the programme, five monitoring periods were planned over a seven-month period. The considerable amount of data that was generated was then analysed at length to determine how electricity demand and behaviour change with the availability of supply, and how schedules can be optimized to better meet people's needs.[147]

Several obstacles stemmed from the fact that installing meters and undertaking such extensive monitoring do not bring immediate rewards to either the households or the electricity provider. The ICRC thus worked closely with the community and the electricity provider to ensure that the project would increase the reliability of the supply to households, and this helped with bill collection. The ICRC had to repeatedly assure the provider that the project would achieve its goals, and this built pressure to deliver on the investment. The ICRC also relied on the good relationship it had with both the community and the providers to install meters and monitor use in the first place.

The results of the analysis (released in April 2020) revealed a number of interesting relationships, including, for example that the total peak demand for electricity would decline if the overall availability of electricity increased (owing to people changing their usage habits once confident that the supply was reliable). This finding might suggest that the electricity saved through lower demand could be used to meet demand elsewhere. Monitoring also revealed considerable losses in the network, which the providers and the ICRC could then address.[148]

The monitoring report demonstrated the potential of the project to meet the hopes that had been raised, although it is too early at this stage to claim feasibility. Losses are projected to be reduced and the load to be fine-tuned so that it can be distributed in the most efficient manner. Instead of the eight hours on/eight hours off supply scheduled by the supplier, the expectation is that GEDCo will supply all households with electricity 24 hours per day (at rotating power thresholds) for a few days per week. Future monitoring is required to determine the extent to which this rotating power-sharing schedule satisfies the great bulk of households and results in an increased bill-collection rate.

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145 "Your wife operates her iron differently than my wife", in the words of the Director-General of PENRA.
146 Internal document: ICRC, *Smart Meters Analysis Report*, 2020 (Smart Meters Analysis Report - Final.docx).
147 *Ibid.*
148 Internal document: ICRC, *Smart Meters Analysis Report*, 2020 (Smart Meters presentation_April 2020.pptx).

More effective programming in protracted urban armed conflicts? The effectiveness of the project is perhaps most evident in GEDCo's adoption of the wider set of uses offered by smart meters (i.e. beyond increasing bill collection rates). GEDCo is now involved in a large project with the World Bank to equip factories, for instance.[149] The considerable analysis required to monitor and tweak the meters has also led in part to the development of a business intelligence unit within the provider, which sets the stage for further analysis.

Lessons: Aspects of resilience are evident through the redundancies that were created by certain components of the project. The clever attributes of GEDCo's smart meters were being considerably underutilized. With (relatively little) technical support from the ICRC, their potential has been expanded, the electricity supply is more reliable and flexible, and the project design and monitoring components included both the direct beneficiaries and the authorities as secondary beneficiaries.

This project was very heavy on both analysis and infrastructure. As with the load management project, this one worked thanks to the technical expertise of the staff involved, the willingness of all parties to cooperate, the relatively good state of existing infrastructure, and the project designer's open-mindedness and ability to think and consult with others before acting. It is also worth noting that this kind of project can succeed only if the community is self-organized to the point that it can engage effectively with both the ICRC and the authorities.[150] In effect, the ICRC has become a provider of digital services in this situation, a role that it may be very well-placed to play for the coming decades.

Several lessons have been learned from the foray into smart meters:[151] the process of importing equipment into Gaza should begin at the earliest stage to account for the considerable delays; the ICRC and the electricity provider should engage more thoroughly with the community in order to gain or maintain their trust; and the lines of communication between the ICRC and the electricity provider should be strengthened or made more routine, particularly given the considerable length of the project. Most recently, there have been concerns that the provider will increase the rate charged to households benefiting from the project, as well as concerns about relative inequity (i.e. why some people enjoy a better electricity supply than their immediate neighbours). Continuous monitoring at multiple levels, as suggested in the GRP Monitoring Strategy,[152] will at least help raise awareness of such unintended outcomes.

D6 BRIEF STUDY OF THE HYBRID GRID (AL AWDA TOWERS)

The Challenge: As was the case with the load management (smart meters) project discussed in Section D5, no increase in the overall amount of electricity supplied to or produced in Gaza is expected anytime soon. Any additional electricity produced or recovered through the more efficient use of the electricity that is currently available will contribute indirectly to beneficiaries throughout Gaza. The smart meters owned by GEDCo were not being used to their full potential. Initial results from the load management project at Al Karameh and the experience of several development organizations suggest that establishing independent electricity grids is a better way to meet people's needs.

The idea behind hybrid grids – also referred to as microgrids, minigrids or community electrification projects – is to deliver a more reliable supply by combining different sources of electricity (e.g. diesel, solar or fossil fuel), whether formal (on-grid) or informal (off-grid). Experience serving up to half a billion people throughout the world shows hybrid grids work best where there is high population density and demand, and people are underserved.[153]

149 Interviews Partner 1, Partner 2.
150 Interview Gaza 1.
151 Internal documents: ICRC, *Smart Meters Analysis Report*, 2020 (Smart Meters Analysis Report - Final.docx), and ICRC, *TITLE*, DATE (Smart Meters presentation_April 2020.pptx).
152 Internal document: ICRC, GRP *Monitoring Framework*, 2020 (200429_MonitoringNote.docx).
153 World Bank, *Mini Grids for Half a Billion People*, p. 5, 2019.

A typical response. The ICRC is not typically confronted with challenges of this type and scale, which are usually viewed as better left to the master plans of the authorities or development organizations.

The project and process: The qualified success of the load management project suggests that the same approach could be scaled up and expanded to include different types of electricity by design. The process involves selecting an appropriate community, choosing and installing sophisticated (if not necessarily large-scale) electrical components, and designing an effective operating system. The process is demanding. Indeed, the first company contracted in 2019 to fill the gap of in-house technical expertise failed to deliver on its TORs primarily for this reason. This obliged the WatHab Unit to develop its own expertise. It selected the most appropriate community through a custom analysis based on criteria such as costs, solar availability and existing generator capacity. Once the choice was made, a questionnaire was completed by 13 representatives of local businesses, schools and households in November 2019.

Lessons: While it is too early to draw lessons from the project's implementation, three lessons can be learned from its preparatory work. First, hybrid grids are complex to implement even for those who are experienced with them. This is because hybrid grids must work with the existing electricity infrastructure, which is a very complicated mix comprising the national grid, solar heaters, solar panels, generators and so forth (see above). A certain amount of complexity also derives from dealing with the community, in terms of power dynamics and interests invested in the current system, not to mention people's intention to benefit relatively more from a new system. These considerations are not likely to be gleaned from a stakeholder questionnaire and must be assessed though local intuition and information, which an external consultant does not possess. While local ICRC staff members have this knowledge, they may not have experience working with communities. The second lesson is that hybrid grids are challenging to implement because of their size. Hybrid grid projects are much larger than the load sharing project discussed in Section D5 and must consider issues of property ownership as well as different business models – all involving the community, the electricity provider and the local authorities. The third (and in many ways most impressive) lesson is the extent to which this new way of looking at the challenge – how to get more electricity when there is none? – continues to be instructive. The response to the challenge led to the *Coping Mechanisms Catalogue*, which formed the basis for the suite of digital services projects[154] – notably the synchronization of generators (Section D3), the solar feed-in/net-metering project (Section D4) and the load management project (Section D5). A hybrid grid was not on the minds of the engineers who designed the first project. The idea came about, however, by virtue of continuous questioning and (double- and triple-loop) learning. The project may yet prove to be beyond the ICRC's capacity, or it may turn out to be just another stepping stone toward an even more effective project type that cannot currently be envisioned.

D7 BRIEF REVIEW OF THE HIA SCOPING STUDY

The Challenge: While the ICRC is equipped to deal with acute health emergencies thanks to its considerable knowledge in this area, it knows relatively little about the general public health situation in Gaza. It thus has difficulty developing preventative-type programmes.[155] There is also little knowledge in general about the links between human health and environmental conditions.

A typical response: The traditional response to this challenge would be to ignore it. Acute health issues are certainly significant enough in Gaza to keep emergency programming in place.

The project and process: The HIA scoping study was a response to one of the recommendations made in the foundational 2018 *Resilience Assessment*, which called for a geo-referenced epidemiological study. As discussed in Section C.2, the Health and WatHab Units initiated the study in 2019 through a short consultancy with the Swiss Tropical and Public Health Institute. The more

154 Interviews GVA1, GVA2.
155 Interview IL/OT 8.

specific remit of the HIA scoping study was to characterize health impacts related to essential public services, prioritize essential-service-related priorities to safeguard public health, and establish a geo-referenced epidemiological surveillance system.

The HIA scoping study consulted people from across the water, health and electricity sectors working at universities, service providers and international organizations. The consultations revealed several areas of concern between urban services and public health. These include the noise and air pollution created by generators, the lack of good indicators on environmental health, concerns over drinking water quality and wastewater treatment levels, and the presence of antimicrobial resistance throughout the environment (including in the water and wastewater supplies).[156] The HIA scoping study is thus credited with "making the invisible visible".[157] It also stakes out the route to implement some of the recommendations (made as recently as June 2020), notably in terms of better understanding the link between antimicrobial resistance and wastewater in health-care facilities.

More effective programming in protracted urban armed conflicts? The incisive knowledge and insight generated by the HIA scoping study appear to provide a way to "operationalize operational resilience"[158] by identifying entry points into project design. By highlighting issues that were not previously considered, the HIA scoping study has also created a sense of urgency in the Health Unit that should serve to mobilize resources required to implement the projects that are currently being designed.

While it is too early to draw any lessons from the HIA scoping study, the analysis has clearly brought the different ICRC units and stakeholders together. Both the traditional water and health silos are being severely breached here. The assessment did not directly engage with the concept of operational resilience or the operational resilience approach. However, in encouraging engagement with interdependent parts of society, and in bringing water and health experts into closer contact with the communities, the HIA scoping study is most assuredly far-sighted, broadly targeted, integrated and inclusive. And it lays the basis upon which more effective programmes in protracted urban armed conflicts may be built. The question that remains is whether the structures and processes that will encourage this innovation (see Chapter 2) will be created to support it.

156 See the baseline description in: Swiss Tropical and Public Health Institute, *Health impact assessment (HIA) scoping study of the Gaza Strip integrated essential services*, Swiss Tropical and Public Health Institute, 2019 (not published).

157 Interview IL/OT 8.

158 Interview IL/OT 8.

ANNEX E

GUIDANCE TO FOLLOW THE PROTRACTED CONFLICT OPERATIONS CYCLE

STAGE	STEPS	GUIDANCE	METHODS/NOTES
	LEARN FROM THE LAST STEP! (SEE BELOW)		
UNDERSTANDING	CONCEPTUALIZE	Consider existing data	Review data from feedback generated by the Learning stage of completed or ongoing projects
		Consult with stakeholders and other ICRC units	Round table
		Flesh out experience and intuition	Brainstorm
		Consider the short-, medium- and long-term	Scenario planning
		Consider alternative ways of achieving same objective	Brainstorm
	ANALYSE 1	Map out actors in most relevant manner	Stakeholder mapping (power vs interests mapping, agent-based modelling, etc.); geospatial analysis; brainstorming
		Leverage existing team strengths	
		Spot potential entry points and windows of opportunity	
		Spot opportunities for collaboration	
		Determine data required for next steps	
	COLLECT DATA	Data required: • Impact – direct, indirect and cumulative, reverberating effects • Beneficiaries – primary, secondary and tertiary • Coping methods • Plans of authorities and of development and humanitarian organizations • Interdependencies/links between stakeholders and between sectors	Data types: qualitative/quantitative, primary/secondary
	ANALYSE 2	Understand interdependencies between sectors, people, organizations, etc.	Analytical tools: cause-consequence diagram; dependency matrices; two-way graphs; conceptual mapping; social network analysis; geospatial analysis
		Consider alternative medium- or long-term scenarios	Scenario planning
		Identify risks and hazards, and beneficiaries	See hazard and beneficiary mapping (Section 2.3)
		Determine how to fill gaps in data and expertise	In-house or external consultant
PLANNING	DEFINE PARAMETERS	Specify GOs and SOs that: • meet stakeholders' short-term needs (e.g. existing EPPs) • align with stakeholders' medium- or long-term needs and plans	
	DESIGN	Maximize essential protracted urban armed conflict design characteristics	Far-sighted; broadly targeted; impact-focused; interdependent; inclusive; redundant; integrated; flexible
		Demonstrate desirable protracted urban armed conflict design characteristics	Empowering; rapid; reliable; robust
		Identify potential outcomes through Hazard and Beneficiary Mapping	See Hazard and Beneficiary Mapping (Section 2.3)
	CONSULT	Appraise project design with stakeholders and other ICRC units	
EXECUTING		As per normal ICRC procedure, with a view to building up in-house expertise	
LEARNING	MONITOR	Track outcomes against the hazard and beneficiary mapping	Identify the hazard; map out the local hazard footprint; map out the real hazard footprint; identify the primary, secondary and tertiary beneficiaries; assess the potential degree of impact
	CONSULT	Appraise project performance with stakeholders and other ICRC units	
	LEARNING LOOPS 1, 2 AND 3	Single-loop learning: feed all lessons learned back into the Understanding stage	
		Double-loop learning: query the assumptions that led to the lessons	
		Triple-loop learning: query the context, processes, and culture that led to the assumptions	

ANNEX F

METHODOLOGY

This study was initiated by ICRC's WatHab unit in Geneva. The research was co-designed by ICRC staff members Federico Sittaro, Michael Talhami, Joana Cameira, Natalia Blanco Guiard and Mark Zeitoun between October 2019 and February 2020. Research was conducted by Mark Zeitoun from October 2019 to July 2020. This included a review of over one hundred ICRC documents (e.g. reports, correspondence and presentations), and several dozen external reports and journal articles.[159] Interviews with the following key stakeholders were conducted between January and June 2020.[160]

CODE	REFERRED TO AS	POSITION	ORGANIZATION
J1	IL/OT 1	Head of mission	ICRC IL/OT
J2	IL/OT 2	Head of delegation	ICRC IL/OT
J3	IL/OT 3	Deputy head of delegation	ICRC IL/OT
J4	IL/OT 4	IHL coordinator	ICRC IL/OT
J5	IL/OT 5	PROT coordinator	ICRC IL/OT
J6	IL/OT 6	COM coordinator	ICRC IL/OT
J7	IL/OT 7	EcoSec coordinator	ICRC IL/OT
J8	IL/OT 8	Health coordinator	ICRC IL/OT
J9	IL/OT 9	WatHab coordinator	ICRC IL/OT
GVA1	GVA1	Former WatHab coordinator at IL/OT	other
GVA2	GVA2	Strategic planner (health and urban)	ICRC Geneva
GVA3	GVA3	Urban adviser	ICRC Geneva
G1	Gaza 1	WatHab engineer	ICRC Gaza
G2	Gaza 2	WatHab engineer	ICRC Gaza
G3	Gaza 3	WatHab engineer	ICRC Gaza
G4	Gaza 4	Resilience adviser	ICRC Gaza
G5	Gaza 5	WatHab engineer	ICRC Gaza
G6	Gaza 6	Head of subdelegation	ICRC Gaza
P1	Partner 1	Head of business intelligence unit	GEDCo
P2	Partner 2	Head of metering unit	GEDCo
P3	Partner 3	Director-general	PENRA
P4	Partner 4	Director-general	CMWU
P5	Partner 5	Deputy DG for technical affairs	CMWU
P6	Partner 6	Public health specialist	PWA
P7	Partner 7	Head of Gaza coordination unit	PWA
P8	International 1	Head of Palestine programme	GIZ

The report, written by Mark Zeitoun, incorporates feedback on earlier drafts from Federico Sittaro, Michael Talhami, Joana Cameira, Natalia Blanco Guiard, Emma Houiellebecq and Benjamin Moon. The study is considered complete and accurate within its limitations. Because the research was carried out remotely, many of the details of the projects and programmes could not be assessed visually. The level of detail entered into thus remains lower than originally intended, and potential misunderstandings have been clarified through the internal review. Some bias is likely to have resulted from the selection of participants. Most of the interviewees – 18 out of 27 – were from the ICRC, for example, and several of the interviewees were open about being either in favour of or against the documented approach. As the report is intended for internal ICRC audiences and was never intended to serve as an evaluation, the level of triangulation achieved through the internal review is considered adequate, and the quality of the documentation is considered sufficient.

159 Available in upon request.

160 They were conducted remotely, due to travel restrictions related to the COVID-19 pandemic.

REFERENCES

ARUP and the Rockefeller Foundation, *Measuring City Resilience – Research Report Volume 4/6*, ARUP and the Rockefeller Foundation, 2016.

ARUP, the Resilience Shift, the Rockefeller Foundation and the Stockholm International Water Institute, *The City Water Resilience Approach*, ARUP, the Resilience Shift, the Rockefeller Foundation and the Stockholm International Water Institute, 2019.

ICRC, *Public Health Engineering During Armed Conflict: 1983-2013*, ICRC, Geneva, 2013.

ICRC, *Urban services during protracted armed conflict: a call for a better approach to assisting affected people*, ICRC, Geneva, 2015.

ICRC, *Armed Violence and the New Urban Agenda: The ICRC's recommendations for Habitat III*, ICRC, Geneva, 2016.

ICRC, *Explosive Weapons in Populated Areas – Factsheet*, ICRC, Geneva, 2016.

ICRC, *Protracted conflict and humanitarian action: some recent ICRC experiences*, ICRC, Geneva, 2016.

ICRC, *ICRC Strategy 2019–2022*, ICRC, Geneva, 2019.

ICRC, *Israel and the Occupied Territories: Concept note for helping to build people's resilience to the humanitarian conseqences of chronic difficulties in the Gaza Strip*, ICRC, Geneva, 2019.

ICRC, *Building sustainable humantiarian impact with people affected by protracted conflict and chronic violence – ICRC Policy Paper (working draft)*, 2020.

International Institute for Environment and Development, *Water, crises and conflict in MENA: how can water service providers improve their resilience?*, International Institute for Environment and Development, London, October 2017.

Rural 21, "The nexus: Joining forces – peace-building, humanitarian assistance and development co-operation", *Rural 21 – The International Journal for Rural Development*, Vol. 53, No. 1, 2019.

Southern Harbour, *A Comprehensive Resilience Assessment of the Integrated Essential Services in the Gaza Strip - Part 1: Resilience Assessment*, Southern Harbour, Toronto, 2018 (not published).

Swiss Tropical and Public Health Institute, *Health impact assessment (HIA) scoping study of the Gaza Strip integrated essential services*, Swiss Tropical and Public Health Institute, 2019 (not published).

UK Department for International Development, *Defining Disaster Resilience: What does it mean for DFID?*, UK Department for International Development, London, 2011.

United Nations Development Programme, *Yemen Resilience Programme - Policy brief*, UNDP, New York, 2015.

United Nations Institute for Disarmament Research, *Understanding the Reverberating Effects of Explosive Weapons: A Way Forward*, UN Institute for Disarmament Research, Geneva, 2016.

United Nations University Centre for Policy Research, *Conceptualizing City Fragility and Resilience*, UN University Centre for Policy Research, New York, 2016.

World Bank, *Building Urban Resilience: An Evaluation of the World Bank Group's Evolving Experience (2007–17)*, Washington DC, 2019.

World Bank, *Mini Grids for Half a Billion People: Market Outlook and Handbook for Decision Makers*, World Bank, Washington DC, 2019.

World Bank Group, ICRC and UNICEF, *Joining Forces to Combat Protracted Crises: Humanitarian and Development Support for Water Supply and Sanitation Providers in the Middle East and North Africa*, World Bank Group, ICRC and UNICEF, Washington DC, 2021.

Adger, W.N., "Vulnerability", *Global Environmental Change*, Vol. 16, No. 3, August 2006, pp. 269–281.
Agyris, C., On Organizational Learning, Blackwell, Cambridge, 1999.

Agyris, C., On *Organizational Learning*, Blackwell, Cambridge, 1999.

Béné C., *et al.*, "Resilience: New Utopia or New Tyranny? Reflection about the Potential and Limits of the Concept of Resilience in Relation to Vulnerability Reduction Programmes", IDS Working Papers, Vol. 212, No. 405, September 2012, pp. 1–61.

Béné C., *et al.*, "Review Article: Resilience, Poverty and Development," Journal of International Development , Vol. 26, No. 5, July 2014, pp. 598–623.

Brown, K., "Global environmental change I: A social turn for resilience?", *Progress in Human Geography*, Vol. 38, No. 1, August 2013, pp. 101–117.

Cannon, T. and Mueller-Mahn, D., "Vulnerability, Resilience and Development Discourses in the Context of Climate Change", *Natural Hazards*, Vol. 55, No. 3, January 2010, pp. 621–635.

Davidson, D., "The applicability of the concept of resilience to social systems: Some sources of optimism and nagging doubts", *Society & Natural Resources*, Vol. 23, No. 12, August 2010, pp. 1135–1149.

De Moel, H., et al., "Flood risk assessments at different spatial scales", *Mitigation and Adaptation Strategies for Global Change*, Vol. 20, May 2015, pp. 865–890.

Hall, J.W., et al., "A framework for analysing the long-term performance of interdependent infrastructure systems" in J.W. Hall et al. (eds), T*he Future of National Infrastructure: A System-of-Systems Approach*, Cambridge University Press, Cambridge, 2016.

Houiellebecq, E., *Urban Resilience in Post-Disaster Recovery: A Case Study on the 2015 Nepal Earthquake*, MA diss., University of Cambridge, 2017.

Jules-Plag, S.-A., "Supporting the Implementation of SDGs", *Geospatial World*, 15 August 2016.

Mulhem, N., Working in Fragile and/or Conflict-Affected Contexts: Challenges and Opportunities for GIZ Corporate Survival, GIZ, Amman, 2015 (not published).

North, D.C., *Institutions, Institutional Change and Economic Performance*, Cambridge University Press, Cambridge, 1990.

Pant, R., et al., "Analysing the risks of failure of interdependent infrastructure networks", in J.W. Hall et al. (eds) *The Future of National Infrastructure: A System-of-Systems Approach*, Cambridge University Press, Cambridge, 2016.

Ramalingam, B., Aid on *the Edge of Chaos*, Oxford University Press, Oxford, 2013.

Robards, M., *et al.*, "The importance of social drivers in the resilient provision of ecosystem services", *Global Environmental Change*, Vol. 21, Issue 2, May 2011, pp. 522–529.

Sharp, G., *The Politics of Nonviolent Action*, Porter Sargent, Boston, 1973.

Talhami, M., and Zeitoun, M., "The impact of explosive weapons on urban services: direct and reverberating effects across space and time", *International Review of the Red Cross (IRRC)*, Vol. 98, No. 1, 2017, pp. 53–70.

Tosey, P., Visser, M., and Saunders, M.N., "The origins and conceptualizations of 'triple-loop' learning: A critical review", *Management Learning*, Vol. 43, No. 3, December 2011, pp. 291–307.

Vikesland, P., "Differential Drivers of Antimicrobial Resistance across the World", *Acc Chem Res*, Vol. 52, No. 4, March 2019, pp. 916–924.

Wendt, L., Alobeidi, A., and Straßer, P., *Gaza Electrical Resiliency Project Report*, Issue 3.1, ZGIS, Universität Salzburg, EO4Hum, 2019 (not published).

Wisner, B., *et al.*, *At Risk: Natural Hazards, People's Vulnerability and Disasters*, 2nd ed., Routledge, London, 2003.

Zeitoun, M., *et al.*, "Urban Warfare Ecology: A Study of Water Supply in Basrah", *International Journal of Urban and Regional Research*, No. 41, November 2017, pp. 904–925.

Zeitoun, M., *et al.*, "AMR and Covid-19 on the Frontline: A Call to Rethink War, WASH, and Public Health", *Annals of Global Health*, 87, February 2021, pp. 1–6.

The ICRC helps people around the world affected by armed conflict and other violence, doing everything it can to protect their lives and dignity and to relieve their suffering, often with its Red Cross and Red Crescent partners. The organization also seeks to prevent hardship by promoting and strengthening humanitarian law and championing universal humanitarian principles. As the reference on international humanitarian law, it helps develop this body of law and works for its implementation.

People know they can rely on the ICRC to carry out a range of life-saving activities in conflict zones, including: supplying food, safe drinking water, sanitation and shelter; providing health care; and helping to reduce the danger of landmines and unexploded ordnance. It also reunites family members separated by conflict, and visits people who are detained to ensure they are treated properly. The organization works closely with communities to understand and meet their needs, using its experience and expertise to respond quickly and effectively, without taking sides.

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