8

Post-disaster recovery

> When we got to Najaf (about half-way to Baghdad) … I called Lieutenant General (LTG) Wallace, the V Corps Commander, and said, 'Hey boss, there's good news and bad news. The good news is we own Najaf.' And he responded, 'Great, congratulations! … So, what's the bad news?' And I explained, 'The bad news is the same as the good news: we own Najaf.'[1]
>
> —David Petraeus, 'Reflections on wars in Iraq and Afghanistan'

> As megacities grow, lesser natural events may cause greater suffering and damage. Jakarta's January 2013 flooding displaced over 40,000 people despite the amount of water flooding the city being less than that in 2007.[2]
>
> —World Vision, *Cities Prepare!*

Most post-disaster recovery undertakings follow some progression along the lines of: 1) immediate relief (during which the focus is on saving the lives of those trapped beneath rubble, urgently in need of medical attention or otherwise at dire risk; 2) initial recovery (including getting food and other needs to residents and the initial cleanup of debris, among other activities; and 3) rebuilding/reconstruction. The three are sequential to an extent but overlap considerably. As with targeting during urban combat, it's important to consider both the short and the longer-term implications of decisions and actions throughout. The previous example of focusing on repairing damaged multi-unit housing structures rather

1 David Petraeus, 'Reflections on wars in Iraq and Afghanistan', *PRISM: The Journal of Complex Operations* 7(1) (14 September 2017), [Washington, DC: National Defence University], available from: cco.ndu.edu/News/Article/1299605/reflections-on-wars-in-iraq-and-afghanistan/.

2 World Vision, *Cities Prepare!*, 61.

than tearing them down and rebuilding from scratch is a good one. While rebuilding might be cheaper or more desirable from the landlord's perspective, ways of more quickly bringing residences back into service—perhaps while renters live in less-damaged portions—hasten the return to normalcy, preserve community cohesion and allow the economically disadvantaged to return to previous, affordable housing. No differently than in preparing for or dealing with a disaster in progress, keeping an eye on the big picture and systems effects in its aftermath increases the chances of ultimate success.

The context of recovery

> Hamburg also used rubble to raise the level of one whole bombed-out area, Hammerbrook. [It] had been built originally on marshland and had perpetually suffered from bad drainage and defective sanitation … During the blockade, Berlin trucked its rubble to the airports at Tegel, Tempelhof, and Gatow to build new runways.[3]
>
> —Jeffry M. Diefendorf, *In the Wake of War*

> Urban growth that occurs in wartime is extremely difficult to reverse and is likely to be permanent.[4]
>
> —Jo Beall and Tom Goodfellow, 'Conflict and Post-War Transition in African Cities'

Reversing a city's population growth after rural drought, insurgency or another of nature or humankind's ravages is no less difficult than after a war. Whether aid provider, urban authority or soldier, it is after the event that the toughest challenges present themselves. The city will survive. The question is at what cost to its population.

Common sense is one key to keeping costs low—or at least lower than if it is absent. 'Social distancing' became the phrase of the day (and weeks and months) during the Covid-19 crisis in New York City. Self-isolation of those exposed went hand-in-hand with what should always be routine but became gospel: diligence in handwashing and, once the evidence became clear, wearing masks. But beware the terms 'common sense' and 'routine'.

3 Diefendorf, *In the Wake of War*, 27.

4 Jo Beall and Tom Goodfellow, 'Conflict and Post-War Transition in African Cities', in *Africa's Urban Revolution*, Susan Parnell and Edgar Pieterse (eds), New York, NY: Bloomsbury Academic, 2014, 18–34, at 26, doi.org/10.5040/9781350218246.ch-002.

What is common sense for some has difficulty taking root elsewhere. The amount of hand sanitiser used in 2011–12 by Norwegian, Swedish and Danish hospital personnel was more than five times that used in Italian, Bulgarian and Romanian hospitals.[5] In 2014 in Amsterdam, access to pressurised chambers was provided for medical personnel dealing with Ebola patients in contrast with the cross-contamination that characterised the sarin attack in Tokyo (those entering or leaving the 'Ebola room' had to wait until a wall monitor signalled they could enter or depart, the overpressure ensuring the virus could not escape).[6] Conditions in various urban areas are certainly no more uniform today. The same is true of property ownership, recordkeeping, safety regulation, policy wisdom or cultural responses to disaster conditions. At least one New York City religious community demonstrated little social responsibility during even the worst of Covid-19's rampage by ignoring social distancing guidance and policies for group gatherings. The lack of responsibility would later find company in beachgoers, church services and political rallies elsewhere in the country.

Two developed-world megacities offer an interesting comparison in terms of post-earthquake recovery. While our previous discussion of post-quake Los Angeles and Osaka–Kobe focused on the benefits of restoring rather than tearing down and replacing multifamily structures, there are additional factors in play when considering a broader range of property ownership types. Who owns a plot of land in Los Angeles is seldom in question. Such is the case in most of the United States. This clarity meant knowing who was responsible for making recovery-related decisions was straightforward after the 1994 Northridge tremors. The physical nature of lots also simplified recovery. Properties in affected areas tended to be somewhat large with significant space between adjacent structures. Permission to access a property therefore relied only on its owner. The same was less true a year later when Osaka–Kobe was badly shaken. Greater building densities, laws allowing overlapping responsibilities for a given plot of land or structure and competing levels of influence meant healing was more complicated.[7]

Similar trials can arise when multiple authorities share rights to a piece of land or the strata below and above ground (think of an owner or local utility being responsible for water or sewage piping depending on where

5 'First, wash your hands: Battling superbugs', *The Economist*, [London], 26 January 2019, 43–44.
6 ibid.
7 Olshansky et al., *Opportunity in Chaos*, 11-3.

a break occurs). Here again, the experiences of war can tell us something of the challenges to come as subterranean features become increasingly common in urban areas. Both Berlin's and Hiroshima's devastation in World War II left subterranean infrastructure less damaged than that aboveground. Buried waterlines throughout the area torn apart by the first atomic bomb attack suffered little damage compared with surface construction.[8] The same was true of Berlin's buildings after its air bombardment. As underground shopping centres, public transportation and even private homes become the norm rather than the exception, who should receive priority in the sequencing of repairs, right of way during construction or for decisions regarding lengthier or more timely reparations? If policies are not in place pre-calamity, decisions or court cases will both delay community recovery and make it more expensive.

Urban systems during recovery

> In Manila and Nairobi a cash-transfer delivery system helped … regain a measure of food security; it was also used by beneficiaries to restart their livelihoods.[9]
>
> —Jean Yves Barcelo et al., *Meeting Humanitarian Challenges in Urban Areas*

> Nigeria has a youth population of about 80 million, representing 60 percent of the total population … A specific form of witchcraft used to evade the police is called ayeta, or 'bulletproof.' Members of the gang consult witchdoctors, who perform rituals to make sure gang members evade bullets fired at them by police. According to eyewitnesses, the charms are successful and have contributed to minimal police presence in areas … The political elite also protect gangs and ethnic militia members, making it difficult for the police to effectively enforce the law … As a result, ethnic conflict from the past remains a dimension of contemporary political life.[10]
>
> —Jane Lumumba, 'Impossible Possibilities'

8 Diefendorf, *In the Wake of War*, 19; and Reader, *Cities*, 193–94.

9 Jean Yves Barcelo, Ansa Masaud and Anne Davies, *Meeting Humanitarian Challenges in Urban Areas: Review of Urban Humanitarian Challenges in Port-au-Prince, Manila, Nairobi, Eldoret*, UN-Habitat Report, Nairobi: United Nations Human Settlement Programme, 2011, iv, available from: www.calpnetwork.org/wp-content/uploads/2020/01/humanitarianchallengesurbancasestudies-1.pdf.

10 Jane Lumumba, 'Impossible Possibilities: The Fragility and Resilience of Lagos', in *Building Resilience in Cities under Stress*, Francesco Mancini and Andrea Ó Súilleabháin (eds), New York, NY: International Peace Institute, June 2016, 38–49, at 38, 40, 41.

The tangled web of interconnections within and between megacities means the tremors of decisions made during recovery and rebuilding will reach far in terms of time and wide in terms of the numbers of people affected. Returning to our metaphor of rocks cast into a pond, appropriate decisions and resulting actions cause mere ripples that little disrupt the surface, pleasurably rocking canoes and gently shifting sands to more favourable locations. Poor decisions cause waves that overturn boats, erode the shore and reflect back and forth, inflicting further damage. The dangers of post-disaster inflation have been mentioned above—dangers that, depending on the reach of the crisis, could be urban area–wide, limited to only some communities or sectors of its economy or reverberate around the world. Too much money injected too rapidly or into some segments of the population and not others drives up prices and passions. The first makes money worth less and thus can waste and diminish the value of aid. The second can deepen existing social divides or undermine backing from previously supportive communities. As with so much in an urban area, specific second and higher-order effects can be hard to forecast and impossible to predict. Whether in terms of inflation or other factors, a more appropriate metaphor when the urban area is a megacity would be many separate ponds, each representing a nearby rural area, town or small city, the country of which the megacity is a part, part of the immediate international region or further afield—all impacted by stones cast from the disaster site.

There is money—lots of money—to be made in a disaster's wake. There will never be an absence of unsavoury types wanting to take advantage of that truth. Money is sticky; a bit (or more) stays in the hands of the unscrupulous at every level through which it passes. Chances are some donors will refuse to accept a single centralised manager for setting procedures and distributing money. Others will prefer to fund government officials directly, their intentions having as much to do with gaining influence or future funding as assisting recovery. Nevertheless, administering aid logically and effectively benefits receiver and giver alike even if not all play by the rules. It is a lesson yet to be gleaned from US funding for Iraq's and Afghanistan's national recoveries, which takes us to the subject of governing and control in a disaster's aftermath.

Control in the wake of urban catastrophe

> Bombing tore away the city's skin, revealing tunnels carrying water and human filth, pipes delivering flammable gas, and wires crackling with deadly electricity, but it also gutted and consumed the papers that recorded financial contracts, family links, and personal history.[11]
>
> —Aaron William Moore, *Bombing the City*

> Good government requires an interactive two-way process between the government and the governed.[12]
>
> —Robert Orr, 'Governing When Chaos Rules'

Humankind has been a tad remiss in accepting history's offerings when it comes to managing post-catastrophe recoveries. Commanders and their staff arriving in Los Angeles during and in the aftermath of the 1992 riots drew boundaries between military units as they had been trained to do during combat: along broad streets, city waterways and other obvious terrain features so soldiers could tell where the limits of their responsibilities were even in the dark. Within those boundaries they had to coordinate only with their own leaders. Anything beyond those limits required communicating and carefully coordinating activities with the unit on the other side of the boundary. A boundary should never go down the middle of a street, river or other linear feature, for example, but rather along its edge so that one unit 'owns' the feature. Otherwise, one unit might fire on those approaching thinking them enemy when in fact they are soldiers from the adjacent organisation.

Such obvious features generally make good sense in wartime—less so in 1992 in Los Angeles. Those roads and rivers might be valuable *physical* features, but in urban areas when the worst of combat is past (if there was any), *social* features are the most important. In choosing freeways to bound its subordinate units, staff multiplied the number of police, fire and precinct, district, city, county, neighbourhood and other organisations with which those units had to coordinate. It would have been better to have aligned boundaries with political, administrative, neighbourhood or community limits.[13] These problems were quickly

11 Moore, *Bombing the City*, 101.

12 Robert Orr, 'Governing When Chaos Rules: Enhancing Governance and Participation', in *The Battle for Hearts and Minds: Using Soft Power to Undermine Terrorist Networks*, Alexander T.J. Lennon (ed.), Cambridge, MA: MIT Press, 2003, 232–48, at 233.

13 Medby and Glenn, *Street Smart*, 44.

rectified in Los Angeles by the redesignation of boundaries, but a decade later, coalition forces in Baghdad initially made the same mistake. Life could be even more interesting if the soldiers found themselves in a city like Dubai, in the United Arab Emirates, where the desire to draw foreign investment, expertise and commerce means different parts of the city have very different legal codes and occupants in some areas use the US dollar as official currency rather than the Emirati dirham as for the rest of the city.[14] Even remembering to use administrative lines for unit boundaries does not mean headaches won't exist. Pakistan's largest city, Karachi, suffers from poor infrastructure and national government support. Squabbles between the leaders of the Muttahida Qaumi Movement who consider Karachi their base and provincial leaders from the Pakistan People's Party call into question just who is in charge in various locations. The situation is even tougher in that some neighbourhoods are administered by neither provincial nor city authorities; the army, port authority or a rail company instead has responsibility.[15] That said, there is no reason to make the challenges greater than they must be. Those in charge in Los Angeles or Iraq would have saved themselves headaches with a look over their shoulders at the occupation of Germany after World War II. The US Third Army failed to recognise the wisdom of the British and French, both of which drew boundaries for their military governments along German administrative lines.[16]

NGOs and other relief organisations can draw from these examples as well. Physical features will likely delineate city authorities like police precincts (though the streets in question might be less prominent ones). There will still be advantages in drawing the demarcations between organisations such that one of the two 'owns' the road or other feature when actions such as moving refugees in one direction or supplies in the other are necessary. Likewise, the owner of a route would assume responsibility for coordinating debris clearing, garbage pickup and the like, avoiding confusion as to who is responsible. Depending on what an organisation seeks to achieve, drawing on unofficial divides when establishing boundaries can be equally important. Invisible lines (at least ones invisible to the unwitting outsider) might separate gang turfs, religious communities with long-held antipathies, clans with years-old

14 Brook, *A History of Future Cities*, 359–60.
15 'King of the heap: Karachi', *The Economist*, [London], 26 October 2019, 35–36, at 36.
16 Schadlow, *War and the Art of Governance*, 69.

revenge obligations or organised crime territories previously held in check but now begging for expansion given the collapse of normalcy thanks to natural disaster or war.

Post-disaster recovery operations are fertile ground for innovation and creativity as well as insights such as these. Where to shelter the thousands, tens of thousands or hundreds of thousands who might be de-housed? If authorities maintain a frequently updated list of vacant properties before the event or have a ready way of compiling such a list in disaster's immediate aftermath, the number of individuals who might be accommodated in existing facilities rather than temporary tent cities or trailers could save millions of dollars in logistical costs. These could include Airbnb and other properties, as mentioned previously, encompassing those held as investments (called 'land banking') but rarely if ever occupied. Almost one-third of the apartments in Midtown Manhattan between Fifth Avenue and Park Avenue and 49th and 70th streets are vacant for 10 or more months a year. Hong Kong and London are likewise popular with wealthy real estate investors.[17] It won't be easy. Real estate companies and politicians will join property owners in screaming foul as regulations requiring sharing in times of crisis could take cash from pockets and re-election coffers should real estate markets become less popular because of such laws. Incentives such as tax breaks or assurances regarding repair of damages could mitigate resistance.

Post-disaster comprehensive approaches

> There is still a tendency in each separate unit … to be a one-handed puncher. By that I mean the rifleman wants to shoot, the tanker to charge, the artilleryman to fire … That is not the way to win battles. If the band played a piece first with the piccolo, then with the brass horn, then with the clarinet, and then with the trumpet, there would be a hell of a lot of noise but no music. To get harmony in music, each instrument must support the others. To get harmony in battle, each weapon must support the other. Team play wins. You musicians of Mars … must come into the concert at the proper place and at the proper time.[18]
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> —George S. Patton, Jr, addressing 2nd Armored Division, Fort Benning, GA, 8 July 1941

17 Baker, 'The death of a once great city'.

18 George S. Patton, Jr, address to the 2nd Armored Division, Fort Benning, GA, 8 July 1941, cited in Center for Army Lessons Learned (CALL), *Musicians of Mars II*, Handbook, Fort Leavenworth, KS: CALL, April 2016, iii, available from: usacac.army.mil/sites/default/files/publications/16-12_Musicians_of_Mars_II.pdf.

> The planners commissioned libraries for several poor districts of the city, specifying maximum costs and minimum construction standards; but they left it to individual communities and architects to work out what the individual libraries would look like. The result is [that] very different structures are used in very different ways.[19]
>
> —Richard Sennett, *Building and Dwelling*

'Team play wins'. Whether soldiers or disaster responders, the musicians must be the right ones and join the concert at the proper place and time. This is the elusive but worthy pursuit of orchestration we have previously set as the mark on the wall. But that mark eludes in another sense as well. One might envision all participants following the same sheet music and looking to a single conductor. The reality will be quite different. Conditions change quickly during and after disasters. Rather than a symphony, the preferred approach will be one of jazz improvisation, with one player complementing or replacing another as the situation dictates. Once again, mission command's decentralisation comes to the fore. Orchestration is desirable but unattainable. Improvisation and tolerance of some players being off key will be imperfect yet good enough under even the best conditions.

The importance of even imperfect orchestration is obvious when history shows us the cost of its absence. Mosul, Iraq, tells us that disasters attract both legitimate NGOs and posers whose inexperience, illegitimate agendas or inadequate logistical support mean they offer little other than a burden. Dissatisfied when refused, these mock aid providers will bypass local authorities and neighbourhood representatives to ply their persuasive efforts with politicians or the media, with the worst putting their own agendas before the people they are allegedly there to assist. Legitimate outsiders will not be blameless as some uncarefully vet those joining them locally, hiring individuals who then pass sensitive information to criminals and others with agendas that do not include aiding residents in need. Afghan NGOs were regularly infiltrated by Taliban for information-collection purposes. Somali 'guards' turning on those they were hired to protect remind us that international representatives need to exercise caution when looking for local assistance. Yet, such caution presents something of a conundrum. NGO struggles in the DRC similarly inform us that failing to hire people from local communities can do more harm than the aid provided does

19 Sennett, *Building and Dwelling*, 236.

good. When asked, religious and other leaders might prevent an outsider from making well-intentioned but serious missteps in terms of hiring or otherwise. Melding outsiders' medical knowledge with awareness of local customs could help an international partner in determining how best to handle corpses, for example. While some diseases such as cholera and haemorrhagic fever favour rapid cremation or burial, risk of infection from the dead is generally low. Rapid burial makes later identification difficult and can deny families cultural obligations in treating their deceased.[20] Aid providers will at other times have to find ways of working around potentially deadly practices such as sharing a last meal with the deceased, as was the case with Ebola in 2014 in West Africa.

Deciding on whom to rely for accurate information will undoubtedly be challenging. The problem of outsiders relying on local officials untrusted by the local population initially challenged RAMSI members in Honiara, Solomon Islands, during the summer of 2003. Locals were happy to assist police if they weren't part of the Solomon Islands force. The foreigners appreciated the trust, but it conflicted with RAMSI leaders' hopes of restoring confidence in government authorities who had deservedly lost citizens' favour. RAMSI leaders acted quickly to root out the worst of the police, often asking junior (and therefore less likely to be tainted) members of the force to accompany patrols (Solomon Islands has no military, relying on its law enforcement personnel for security). Individuals approaching the foreign soldiers or police were then directed to take their issues to these 'liaisons' as a first step towards restoring local police legitimacy. Domestic US officials sometimes confront the same hesitation. Knowing residents of select San Francisco communities would be unwilling to deal with less familiar faces, the city's Department of Health assigned restaurant inspectors to gauge the needs of damaged communities after a severe deluge of rain in January 2004.[21] The benefits gained through such wise but careful partnering work both ways. Locals are more likely to have their needs addressed; aid providers can better allocate their resources by avoiding falling victim to con artists.

Though we might tend to think of recovery in terms of individuals or families, what might be called 'mass aid' can be both more efficient and more effective. In the words of former dean of the Johns Hopkins School of Public Health Al Sommer: 'Medicine saves lives retail, one at

20 Sanderson et al., *Responding to urban disasters*.
21 Rodin, *The Resilience Dividend*, 17.

a time, [while] public health saves them wholesale, millions at a time.'[22] Sommer's wisdom extends beyond medicine. Importing bottled water might seem the logical option when addressing a megacity community's lack of drinking water. Author Judith Rodin instead found Coca-Cola's Slingshot program provides systems that can filter and purify water from any source—freshwater, saltwater, even sewage—to make it safely drinkable. One Slingshot filter unit uses less electricity than an ordinary hairdryer and can produce 800 litres of clean water a day—enough to serve 300 people.[23]

There will be problems to overcome no matter how good the plans or how many the pre-event rehearsals. Confronted with gangs, looters, insurgents or corrupt officials, the military will seek to immediately capitalise on any information that helps them get such miscreants off the streets. Police tend to be more deliberate. They must preserve forensic evidence that will stand up in court to put the lowlifes in jail. Appropriately orchestrated mission command guidance that identifies how to resolve potential friction is too often absent. Guidance from international organisations' leaders and from local government can differ. Deployed leaders will at other times find themselves having to 'best guess' as they try to find a workable balance between vague policies from home and requirements on the ground. Partnerships with NGO, IGO and commercial representatives can at times provide options otherwise unavailable. While government officials must toe the political line, these less-constrained partners can make things happen that they cannot.

Post-combat recovery

> As long as people want shelter over their heads, we are going to fight in buildings.[24]
>
> —Sergeant Major David Wilson

> Urban combat magnifies the effects of battle.[25]
>
> —General Stephen J. Townsend, US Army

22 McNickle, *Bloomberg*, 173.
23 Rodin, *The Resilience Dividend*, 289.
24 David Wilson, remarks at Analysis of Urban Warfare, Military Operations Research Society Conference, Quantico, VA, 2 April 2019.
25 Stephen J. Townsend [General, US Army], 'Megacity scenarios, foundations, and convergence', Presentation to MDB in Megacities Conference, Fort Hamilton, NY, 3 April 2018.

Warsaw was 80 per cent destroyed and lost 800,000 of its 1.3 million residents during World War II.[26] One-third of (a then much smaller) New York City was destroyed during Revolutionary War fighting in 1776.[27] Manila saw 100,000 of its 1945 population of 1.1 million killed and many more injured during fighting that year. Dresden and Coventry, Hiroshima and Nanking, Jerusalem and Rome—war has gutted cities and slain their occupants wholesale for centuries. More recently, 'no one even bothered to count how many civilians were killed' during fighting in Grozny and other parts of Chechnya in the 1990s.[28]

Recovery after a disaster regardless of cause provides opportunities to address the otherwise unaddressable. Recovering from the 1871 fire that ravaged Chicago provided an opportunity—one the city seized to become the world's skyscraper king. Hydraulic elevators became commonplace. Less known: steam heating replaced fireplaces as the primary means of warding off Chicago's winter cold in the aftermath of the conflagration.[29] As would be the case in Warsaw nearly 300 years later, the 1666 Great Fire of London destroyed 80 per cent of the city's buildings.[30] As in Chicago, in London:

> [D]estruction caused by the Great Fire provided a major opportunity for the redesign of London … Parliament enacted a number of … schemes. These included: minimum street widths of 14 feet [4.3 metres]; regulations governing the height of buildings in relation to street width; special fire courts to resolve disputes during the rebuilding; straightening of roads; [and] the London Rebuilding Act made (fire-proof) stone and brick compulsory construction materials. Thatched roofs were also replaced with tiled ones.[31]

Megacity officials may suddenly find themselves running engines of great change in the aftermath of catastrophe. Recent lessons from the combat arena have much to offer those facing decisions with consequences lasting decades.

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26 Vale and Campanella, 'Introduction', 4, 10.
27 Page, 'The City's End', 77.
28 Knezys and Sedlickas, *The War in Chechnya*, 260.
29 Neal Bascomb, *Higher: A Historic Race to the Sky and the Making of a City*, New York, NY: Doubleday, 2003, 95–97.
30 Vale and Campanella, 'Introduction', 4, 10.
31 Parker, 'Disaster Response in London', 191.

Getting post-combat right

> We are measuring how much we spend or how many miles of pipeline we lay. That isn't really measuring what's important.[32]
>
> —Colonel John Hurley, US Army

> When General Chiarelli was moving into Sadr City [Iraq], they needed to have water. One of the questions he asked was, 'How do we get water into the neighborhood?' And the solution was to put spigots on the outside of houses. We didn't have the time to run the lines into the houses.
>
> —Anonymous interviewee

'We tend to measure inputs, not outputs', Major General David Perkins observed while commanding the US Army's 4th Infantry Division in Iraq in 2011—years after he suspended patrols in Fallujah. Perkins's observation reinforces Colonel Hurley's just above:

> I believe the coalition's was the largest purchase of electrical generators in the history of the world, a multi-billion dollar contract to buy generators … We were measuring how many generators we ordered and their delivery status. That included the mother of all generators—the MOAG, we called it—this huge thing that came through on a flatbed truck. We tracked it as it moved to wherever its final resting place was. The graph we used to track it started when the generator entered Iraq and we followed it to wherever it was going. At that point the bar was green: MOAG had arrived. Well, just getting a generator to where it's going is maybe 20% of the problem. You've got to build the electrical generation plant. You have to fuel the electric generator. You have to install the transmission lines. And once the transmission lines are installed, you have to distribute the electricity to the houses. We were focused very much on buying electrical generators. But buying generators is not a solution to the problem. The problem is getting electricity into houses. There's a distribution aspect to that. There's a transmission aspect. There's a generation problem. There's a fueling the generator problem. We have a proclivity to focus in on what we understand, what is manageable, what is easily measured. So buying a generator and tracking delivery tends to draw our attention more than a discussion about sub-district distribution of electrical lines and the like. These are the types

32 John Hurley (Colonel, US Army), Interview with Dr Russell W. Glenn, Winchester, VA, 8 November 2011.

> of challenges that I seem to have to deal with again and again. We sometimes make very big decisions and spend a lot of money without having what's last in mind.[33]

Knowing how to measure progress during a megacity recovery is a less-than-obvious enterprise. The number of dollars allocated to projects was an infamous metric of 'progress' in Iraq during US operations from 2003. The demand to spend money resulted in tens of millions of dollars squandered to corruption. It also resulted in focusing on large projects as that meant committing huge amounts in one fell swoop rather than many smaller projects involving more paperwork, management and quality control personnel. Our previous example of installing various parts of a sewage disposal system without considering the whole system brings the point home. Focus on the inputs (dollars spent) rather than the intended effect (in this case, the literal output of removing sewage from homes and neighbourhoods) resulted in wasted funds and waste not moved.[34] Big projects take months or years to build. Smaller projects with impact in a matter of days or weeks are the smart move when popular perceptions are important. It's even smarter if they are tied into a longer-term plan so that small projects flow into large like fingers into a glove.

Solutions do not need to be all or nothing. US Army Corps of Engineers officer Carl Strock recalled his time in Iraq when people were complaining that US efforts were failing because Baghdad did not have electricity 24/7—an impractical standard given the long neglect of power infrastructure under Saddam's regime. Strock realised that the Iraqis weren't asking for constant, all-day power. Eventually perhaps, but in the short run they wanted predictability so that they knew when they would have power and could adjust schedules accordingly.[35] Another project in Iraq saw $18.4 billion committed to building 147 medical facilities. The structures were built and filled with state-of-the-art equipment. Unfortunately, there were not enough people who knew how to maintain the equipment in many locations. Elsewhere there were no staff to train the personnel who would have to run the facilities.[36] The result was both

33 Perkins, Interview.

34 Peter Chiarelli (General, US Army), Interview with Dr Russell W. Glenn, Pentagon, Washington, DC, 9 November 2011, [as appears in Russell W. Glenn, *Core Counterinsurgency Asset: Lessons from Iraq and Afghanistan for United States Army Corps of Engineers Leaders*, Study sponsored by the United States Army Corps of Engineers, 31 May 2012 (revised 8 December 2016), 273–81].

35 Carl A. Strock (Lieutenant General, US Army, retired), Interview with Dr Russell W. Glenn and Dave Dilegge, Frederick, MD, 29 July 2011.

36 Chiarelli, Interview.

a waste of money and a blackeye for the coalition as it rightly appeared someone had failed to think through more than the physical structures that are only one part of a larger medical care system. As with General Perkins's generators, focusing on parts of a system in isolation failed as a measure of success. General Perkins was not alone with his observations:

> For those assisting in humanitarian assistance or similar efforts, General Perkins' outputs (measures of effect) are likely to be what really tells leaders what's being accomplished. [Colonel (US Army, retired)] Greg Fontenot provided two examples from his military career to demonstrate the point. One cited the removal of 2,962 mines by his soldiers when he was a brigade commander in Bosnia-Herzegovina. His immediate senior was quite impressed, but Fontenot told him it wasn't the number of mines removed that was really important to the people … [The area] was seeded with tens if not hundreds of thousands of mines. What was important: the removal of those mines cleared forty-five routes previously closed to pedestrian or vehicle traffic, more than doubling 'freedom of movement' for local citizens. The second example provides what would be an even more misleading example of mistaking an input for a meaningful measure of results. Fontenot used the example of tons of information leaflets dropped in an attempt to convince enemy soldiers that they should surrender. Measuring tons of leaflets dropped would reveal nothing about how much they influenced anyone to no longer fight. A valuable measure of effect might be the number of enemy soldiers who surrendered due to having seen a leaflet, an estimate of which could be obtained by asking a sample of the prisoners why they gave up or counting the number who brought a leaflet with them (if the leaflet directed them to bring one when surrendering).[37]

Rebuilding megacity capacity

> In the immediate aftermath of 9/11, Wall Street profits fell 60 percent and the city lost 130,000 private sector jobs.[38]
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> —Chris McNickle, *Bloomberg*

37 Russell W. Glenn, *Considering Urban Control: A Summary of the 2006 Israeli Defense Forces–US Joint Forces Command Urban Operations Conference*, Santa Monica, CA: RAND Corporation, February 2007, xiii, 31.

38 McNickle, *Bloomberg*, 135.

> Not only do you need a mass of people to re-establish a neighborhood. Their homes need to be in proximity to one another in order to build and maintain relationships, establish organizations, and pursue group activities.[39]
>
> —Judith Rodin, *The Resilience Dividend*

While Japan annually has more people exposed to the dangers of typhoons than the Philippines, history suggests fatalities in the latter would be an estimated 17 times greater than in Japan should storms of like types strike both countries.[40] Richer nations tend to have better building regulations than poorer ones. They tend to enforce them more stringently. They also are likely to better prepare for disasters in other ways. Tokyo's Metropolitan Government has designated 56,553 hectares (565 square kilometres, or 95 per cent) of the Tokyo Ward Area into two types of special districts: fireproof districts and quasi-fireproof districts.[41] In fireproof districts, any building with more than three storeys or over 100 square metres of floor space must be constructed of nonflammable materials such as reinforced concrete. Standards in the quasi-fireproof district require fireproofing of only some larger and taller structures. We have already mentioned other preparations such as the requirement for local governments to prepare disaster preparedness maps and the city's many official evacuation sites that include parks, other open spaces or nonflammable buildings. No resident is supposed to have to travel more than 2 kilometres to reach such a site.[42]

Standards like these explain why Tokyo's losses and recovery demands should be less than for similar disasters in megacities less aggressive with their preparations. There are additional benefits when an urban area is served by competent, noncorrupt officials who ensure these standards are more than paper deep. Urban areas with officials who keep track of where community members live, work or go to school add to readiness. Accounting for residents should be far quicker in such cases—a boon to first responders wanting to determine which homes or other structures might have individuals trapped beneath rubble and to families awaiting news about loved ones. Armed with disaster preparedness maps and knowledge of where their family members are to go when evacuating, men and women returning home from work can plot safer routes and find

39 Rodin, *The Resilience Dividend*, 248.

40 IFRC, *World Disasters Report 2010*, 13.

41 The Tokyo Ward Area comprises the 23 wards that are traditionally considered to make up the 'City of Tokyo'. This is only a small portion of the megacity and contains roughly one-quarter of its population.

42 Kumagai and Nojima, 'Urbanization and Disaster Mitigation in Tokyo', 79, 80.

loved ones more readily. These represent thousands, tens of thousands or more who will less burden overtasked mobile phone systems or government officials with demands to determine family status.

These preparations are even more important when the urban area in question is hyperconnected worldwide. Select commodity markets could conceivably come to a standstill were Manhattan to suffer damage even more extensive than that of 9/11; New York City is the planet's primary hub for coffee trading. These sometimes-unexpected connections (for those of us less familiar with coffee or other commodity markets) are not unusual. Megacities are inherently crucial to financial sectors; other urban areas can be likewise. Frankfurt leads trading for British treasuries—and did so even before Brexit (who would have thought?). Chicago is the top financial centre for futures.[43]

Laying sewer pipes and intermediate pumps in Baghdad without providing connections to a treatment facility was an obvious failure—one understandable if not forgivable given pressures to spend large amounts of relief funds quickly. A second example reinforces the need to plan for the social as well as the physical infrastructure aspects of any project. In this case, it was a $20 million water treatment facility paid for with US funds, successfully completed, but never opened because competing Iraqi factions disagreed on who would run it—something that should have been part of preliminary evaluations (and a reminder of the criticality of knowing both what to ask and how to acquire the answers).[44] Such stumbles wasted funds and bruised reputations. The second is no small matter when insurgent or other parties seek to convince residents that present governments and any party associated with them are unworthy of popular support. Partnering with local government or community organisations should help in early identification of lurking problems. Unfortunately, knowing what questions to ask can be harder than one might think. The right question might be no more than: 'What local issues do we need to be aware of before we start this project?' The earlier quotation regarding libraries in Medellín, Colombia, reflects the fact that asking those affected helps get

43 Saskia Sassen, 'Cities in Today's Global Age', in *Connecting Cities: Networks. A Research Publication for the 9th World Congress of Metropolis*, Chris Johnson, Richard Hu and Shanti Abedin (eds), Barcelona: Metropolis Secretariat General, 2008, 22–43, at 31, available from: www.metropolis.org/sites/default/files/network_complete_0.pdf.

44 Raymond Odierno (General, US Army, retired), Speech to 'Operating in Dense Urban Environments' Class of 1978 Student Workshop for Civil–Military Operations, West Point, NY, 18 April 2018.

it right. Similar meetings, held before making plans or committing funds, would also provide outsiders with a chance to gauge local capacity to manage a project once it is done. Representatives of outside organisations often depart for home while construction, hiring or other elements of a project are still in progress. Knowing if anyone local can see the work through to completion is a guessing game unless someone has determined the lie of the social landscape.

A caution is in order. While strengthening the influence of community organisations seems like a win-win, some city, national or party officials may see grassroots empowerment as a threat to their influence (recall Mexico City government officials' unease when neighbourhood leaders stepped forward in the aftermath of the 1985 earthquake). Communities may see catastrophe as a long-awaited chance to marginalise corrupt or otherwise untrusted authorities. Collective action by refugee camp occupants in Gaza resulted in protests when the UN Relief and Works Agency for Palestine Refugees in the Near East sought to turn over sanitation responsibilities to local officials.[45] On the positive side, pre-existing social ties can serve as a magnet that reunites communities fractured by misfortune. Vietnamese-Americans displaced by Hurricane Katrina re-formed around their Mary Queen of Vietnam Church on return to New Orleans—pieces reuniting like an explosion shown in reverse.[46] Focusing on pieces alone without recognition of previous ties would be like trying to construct a house from random parts of separate structures. The result may be a building but one far from the home it once was. Getting residents back into houses quickly without thought to their once-community—locating them randomly and remotely from longstanding religious, commercial, club, school, neighbourhood and other social links—returns people but fails to reconstruct a city.

As in Hamburg and Berlin after World War II, both the physical and the social elements for rebuilding will lie among the depressing ugliness of post-disaster rubble. The trained eye sees resources where another looks on seeming waste. Designs can take advantage of the shattered pieces by filling wire-mesh containers to form walls. Crushing bricks provides

45 Haysom, *Sanctuary in the City?*.

46 Wei Li, Christopher A. Airriess, Angela Chia-Chen Chen, Karen J. Leong and Verna Keith, 'Katrina and migration: Evacuation and return by African Americans and Vietnamese Americans in an eastern New Orleans suburb', *The Professional Geographer* 62(1) (2010): 103–18, at 116, doi.org/10.1080/00330120903404934.

aggregate for concrete or mortar.[47] Chances are good that the bonds of a city's social structure are only temporarily broken if action is taken with sufficient speed. Some will see opportunity for renewal where others find only ruin, as with the case of Queen of Vietnam Church.

Jakarta suffered the one–two punch of the 1997–98 El Niño's effects on crops and Indonesia's economic crisis in the closing years of the twentieth century. Though calamities of a sort different to this book's focus on sudden shocks, they nonetheless suggest how a megacity can reorient shattered parts and fractured bonds to new purposes. Economic problems were made worse by a third blow: urban violence that disrupted the city in May and November of 1998.[48] NGOs sought to address critical food shortages resulting from this trio of jolts but lacked the infrastructure due to commitments in suffering rural areas and an inability to deal with the magnitude of demand from the megacity's needy millions. A lack of transparency at Indonesia's national level led US Government officials to fear that what aid was available would not reach those poor who were suffering most.

From misery rose innovation, but it came from the commercial rather than the government sector. Rice is the number one cereal consumed by Jakartans. Much of the food aid sent to address El Niño's ravages on agriculture was, however, in the form of wheat. Aid providers saw opportunity where others saw crisis. Noodles had long been popular among Jakarta's poor before the economic crisis. Though that had become less the case when economic crisis reduced incomes, enlightened aid managers recognised that a twofer offered itself: a way not only to feed the poor but also to stimulate portions of the capital's food distribution system, which was lagging as was so much else in the economy. They created a 'market-targeted food assistance program' that included the following parts:

- Imported wheat was ground into flour by one of Indonesia's three flour mills.
- Wheat had earlier been processed by companies later forced to lay off workers when noodle demand dropped. Rejuvenation of wheat availability thus constituted a twofer in a twofer as both the companies and the many economically disadvantaged who were rehired benefited given the new demand.

47 Sanderson et al., *Responding to urban disasters*.
48 Material in this vignette relies on Kelly, *Acute food insecurity in mega-cities*, 10–15.

- Noodles were sold through commercial outlets with prices and packaging designed to accommodate the communities most in need. A quality-control program sought to ensure noodle products met acceptable standards. Managers turned to existing noodle-producing companies' stock management systems to limit corruption by monitoring product movements. A discrepancy between tonnage produced and tonnage sold would result in a fine for the responsible party. Organisations involved in production, distribution and sales were permitted to make a normal profit, however.
- Jakarta delivery companies distributed products throughout the massive urban area, forgoing reliance on government vehicles or limited NGO transport resources. An added benefit: these companies knew where street vendors had operated when noodles were popular before the downturn.
- Other organisations such as marketing and sales companies benefited by helping to identify buyers.
- Recognising that limiting sales to Jakarta would disrupt commercial markets supplying megacity residents, managers expanded the program to other parts of Java, the island on which the capital is located.

The initiative was not without flaws—a major one being the lag between conception and delivery of nearly a year. Nevertheless, the aid community's use of recent history (knowing noodles had been a staple for the poor before the economic crisis), understanding of the megacity's existing capacity for production, distribution and marketing and positive impact on the labour market are remarkable.

More on systems awareness during recovery

> Three weeks after I left [Lagos,] Nigeria, police entered a nearby slum and burned it to the ground, leaving 20,000 people—mostly families with young children—homeless.[49]
>
> —Jeff Goodell, *The Water Will Come*

> Cops hate two things—change and status quo.[50]
>
> —James P. O'Neill, 'Preparing for and managing megacity crises'

49 Goodell, *The Water Will Come*, 231.

50 James P. O'Neill, 'Preparing for and managing megacity crises (the NYPD perspective): 9/11 and Hurricane Sandy lessons for US military leaders', Presentation to Multi-Domain Battle in Megacities Conference, Fort Hamilton, NY, 3 April 2018.

Bukit Ho Swee was where many new arrivals to Singapore settled.[51] Chinese triad splinter groups were among those finding the crowded ramshackle housing and twisting byways a shelter from the police. Youths not in school and lacking parental supervision were willing gang recruits. It should not surprise that the slum had a bad reputation among government authorities. Aware of the criminals, residents nevertheless did not consider their community a crime haven. The gangs provided protection. The doors of homes were left unlocked so people could cut through them to shorten journeys or avoid unwanted contacts. Owners of legitimate businesses, gambling establishments, opium dens and street vendors did not appreciate paying protection money but understood the necessity. Gang members provided what police would not. Intergang violence could at times put those hoping to remain uninvolved at risk, but it was not unusual for one of the gangs to warn residents of the fighting to come. City officials had made it clear they held no love for the poor who lived in the community. Their police were untrusted. Like the Lagos community in the quote above, Bukit Ho Swee would burn to the ground. But unlike the Nigerian fire, it appears an accident rather than the police was the perpetrator that rendered homeless 16,000 people from Bukit Ho Swee and nearby neighbourhoods.

In the Lagos slum of Badia East, many of those forcibly evicted in early 2013 were homeless two and a half years later. Housing for more than 80 per cent of the displaced was worse than what had been demolished. Half were separated from their families and one-third of the children had yet to resume schooling.[52] In Manila, officials housed forcibly displaced residents in locations so distant from their jobs as to make commuting grossly time-consuming if not impractical.

These are brutal but not unusual cases. There are gradations of how punishing neighbourhood destruction can be. Often the ousted receive nothing in the way of land or structures to re-establish themselves. Gradual removal of housing or allowing residents time to move on their own can reduce the pain of displacement. Not turning housing into unusable rubble means families can take materials from their previous residences

51 Material in this vignette comes from Loh Kah Seng, *Squatters into Citizens: The 1961 Bukit Ho Swee Fire and the Making of Modern Singapore*, Singapore: NUS Press, 2013, 65–67, 16–17, doi.org/10.2307/j.ctv1qv3g0.

52 Megan Chapman and Andrew Maki, 'The Cities We Create Depend on the Choices We Make: Lagos', in *Know Your City: Slum Dwellers Count*, Janet Byrne (ed.), Cape Town, South Africa: Slum Dwellers International, 2018, 20–22, at 20, available from: sdinet.org/wp-content/uploads/2018/02/SDI_StateofSlums_LOW_FINAL.pdf.

to rebuild elsewhere. Further, they are more likely to build a structure meeting their needs if they are not forcibly allotted shelter provided by government authorities.[53]

The cause of displacement is often landowners looking for a way to clear the unwanted from their properties when more economically attractive alternatives beckon. As we saw in Karachi, city officials can be in cahoots with landlords. On the other hand, accident or not, Bukit Ho Swee was the lighting of a fuse that exploded into Singapore's highly regarded public housing program—a program that at once improved property standards and brought multitudes in the informal economy into the ranks of taxpaying citizens. Gaining a home in a government-sponsored property required proof of an income from a steady job. Ownership required salary contributions. Both state and individual benefited as the policy forced those wanting housing into the formal rather than the casual workforce.[54] The housing program spawned in the aftermath of the Bukit Ho Swee fire is now the norm for the city-state's residents.

Megacity fragmentation can mollify the negative effects of displacement. Instead of a single CBD with a nearly exclusive hold on select job types, lesser CBDs sprout up at various locations throughout the urban area, as in Los Angeles, where the phenomenon is so common it could be called the 'LA effect'. This dispersal has several benefits, including reducing the length and expense of worker commutes, traffic congestion and pollution (many in Los Angeles might question the comment about traffic congestion. Bottom line: it could be even worse, LA). For Los Angeles, the sprouting of smaller CBDs and cores has been a natural evolution. There is the possibility that similar dispersion could be a deliberate response motivated either by conscious government policy or as an opportunity seized in the wake of a major disaster.

Tokyo in 1995, New York in 2001, London in 2005, Mumbai in 2008, Paris in 2015—there is no lack of evidence that megacities make attractive targets for terrorists. Centralised power, water distribution, communications and other vital infrastructure elements are vulnerable to interruption via assaults that no longer require a physical strike, as cyberattacks have already made clear. The potential value of decentralising select infrastructure despite sacrifices in economies of scale in doing so has already been mentioned. Nature's own means of reducing the severity of her storms merits consideration as well.

53 Acción Contra El Hambre, *Urban Disaster Lessons Learnt*.
54 Seng, *Squatters into Citizens*, 207.

Wetlands and additional natural features act to dampen the worst effects of typhoons and tidal surges, but these are features too often ravaged due to ignorance, carelessness or in the service of greed. It is estimated that storm surges in New Orleans that once ranged from 3 to 3.6 metres have increased to between 5.5 and 6 metres due to the destruction of marshes and other tidal lands near the city.[55] Oyster beds stood metres high in New York City's Hudson River estuary many years ago, acting to breakup waves before they reached shore. Harvesting of the molluscs combined with water pollution to all but eliminate these protective barriers (efforts are under way to replace some of these natural storm-effect mitigators).[56] In times of rising sea levels, examples of past devastation bode ill for any urban area casual about maintaining its natural guardians. In other cases, it is urban pollution combined with high temperatures related to climate change that is the culprit; the causes together have done much to exacerbate Miami's soon-to-be-legendary flooding challenges.[57] Choosing to partner with instead of abusing Mother Nature could save much that otherwise will eventually have to be spent in moving the forward line of buildings to higher ground (if available); constructing seawalls, dykes or other barriers; raising structures on pillars; returning those ravaged areas to wetlands; or simply surrendering to the inevitability of more frequent and damaging floods and increased financial punishment. In developing-world urban areas in particular, that damage and those punishments are more likely to be suffered by the poor living in areas the wealthier avoid. Unfortunately, viable alternative locations may not exist for those in exposed slums. Also unfortunate: the limited political influence such communities generally wield means little will be done other than to leave residents to suffer with little promise of help in the aftermath of a disaster.

It is unlikely Jakarta's program to develop a 'noodle economy' would have succeeded had NGO managers not been aware of the previous noodle system, including the dishes' popularity, drivers' knowledge of where previous markets were and awareness of a need to rein in corruption. Understanding the many parts of the megacity's commercial, social and economic systems made the venture a success (if a someone belated one). Our example of constructing a sewerage system without ensuring connection to a water treatment facility provides a counterexample. A more thorough look would have considered not only the pipe system

55 Brinkley, *The Great Deluge*, 13.
56 Roman Mars and Kurt Kohlstedt, *The 99% Invisible City: A Field Guide to the Hidden World of Everyday Design*, Boston, MA: Houghton Mifflin Harcourt, 2020, 118–19.
57 Ariza, *Disposable City*, 54.

and local pumps, but also power supply for treatment pumps; chemicals essential for purification; availability of talent for maintaining pipes, pumps and power supply; who, where and how those with the necessary talents would be educated; and so much more. And these considerations only touch on that portion of the system within or near the Iraqi capital. The quality of water released from treatment facilities influences the health of those downstream and of the Persian Gulf. So it is with any urban area along a shore or river, as so many are.

More on the ties that bind: Renewing or creating systems capacity

> In 1919 at the Jerusalem Court of Appeals, presided over by Judge Muhammad Yusif al Kahlidi, widely known for both his eccentricity and fairness … a well-known Old City prostitute was brought before him on charges of 'disturbing the peace.' Judge Khalidi apparently had been drinking heavily the night before and was still in a daze when the woman was ushered screaming into the court. [The judge said:] 'Shut up, you whore, and control yourself.' Prostitute: (enraged by the insult) 'My lord, I may be a prostitute at home, but here I am a citizen in the court of the state.' Judge Khalidi: (sobering and taken aback) 'You are absolutely right.' [Judge to the court secretary:] 'Write this down. In the new case of slander … I hereby fine the accused [myself] five Palestinian pounds.'[58]
>
> —Salim Tamari, 'Confessionalism and Public Space in Ottoman and Colonial Jerusalem'

> The cities most at risk are those where these events are already common—although there is some evidence of the geographic range of some extreme weather events expanding. Coastal cities will be doubly at risk as sea-level rise increases hazards from coastal flooding and erosion. For any city, the scale of the risk from these extreme weather events is also much influenced by the quality of housing and infrastructure in that city and the level of preparedness among the city's population and key emergency services.[59]
>
> —David Satterthwaite et al., *Adapting to climate change in urban areas*

58 Salim Tamari, 'Confessionalism and Public Space in Ottoman and Colonial Jerusalem', in *Cities & Sovereignty: Identity Politics in Urban Spaces*, Diane E. Davis and Nora Libertun de Duren (eds), Bloomington, IN: Indiana University Press, 2011, 59–82, at 74.

59 Satterthwaite et al., *Adapting to climate change in urban areas*, 17.

Depending on the extent of the punishment inflicted on an urban area, all or parts of it form a vacuum when existing authorities are removed. Such was the case in Medellín, Colombia, with the killing of drug lord Pablo Escobar, with other criminal elements fighting for control given his sudden absence. The British Army and Royal Ulster Constabulary combined forces to free East Belfast's Ballymacarrett neighbourhood of the Provisional Irish Republican Army (PIRA) in late 1971. They, and civil authorities, succeeded in ousting the PIRA but failed to backfill the resulting void. Within six weeks, the PIRA had re-established its sway; Ballymacarrett was once again other-governed.[60] There is no reason to think megacities are exempt in this regard. First-generation gangs were greatly weakened after a slum-clearing initiative in Mumbai, India, during the 1970s and 1980s. Planning only for initial purges of criminal elements again opened the door to a second generation who took up where the previous had left off. The same happened a second time in the aftermath of religious riots and another round of crackdowns in 1992–93, with the new breed of organised crime becoming even more sophisticated as it added to previous controls over real estate development and commerce, legitimising its status by putting hand-selected representatives in the state legislature.[61]

Again and again, a lesson presents itself: a systems approach is essential to lasting success. That means not only removing criminal elements but also readying effective and legitimate capabilities to step into the void. It means not only training a megacity police force but also comprehensively addressing legal system requirements. It should be a collective effort. Just short of three-quarters of Dhaka's slums benefit from services provided by NGOs; they are an invaluable asset.[62] Their offerings can be even more beneficial if orchestrated with government assets … given the government is effective.

The underlying assumption is that there exists a legitimate government to backfill a vacuum following any removal of other-governed capabilities, to create and maintain an effective legal system or provide services to citizens. Janice Perlman provides 10 ingredients she found common to violence in Rio de Janeiro's *favelas*. These included 'underpaid,

60 Aaron Edwards, 'Misapplying lessons learned? Analysing the utility of British counterinsurgency strategy in Northern Ireland, 1971–76', *Small Wars & Insurgencies* 21(2) (June 2010): 303–30, at 316, doi.org/10.1080/09592318.2010.481427.

61 Brugmann, *Welcome to the Urban Revolution*, 127.

62 Nazrul Islam, A.Q.M. Mahbub and Nurul Islam Nazem, 'Urban slums of Bangladesh', *The Daily Star*, [Dhaka], 20 June 2009, available from: www.thedailystar.net/news-detail-93293.

understaffed, unaccountable police forces; a weak government indifferent to the "rule of law;" [and] a sensationalist mass media empire fomenting fear to … justify police brutality'.[63]

Just as each megacity is unique, an approach successful in one situation might not provide a solution acceptable in another, barring adaptation. Singapore's former long-time president Lee Kuan Yew explained that policies aimed at integrating Chinese, Indian and Malay citizens in the state-sponsored housing program were being defeated when buyers sold their properties. Initial sales designated what percentage of each demographic group could buy into a building, but there were no constraints on who could buy on resale. The result was a drift towards segregation that flew in the face of the original sales policies and the government's objectives. Singapore adapted, setting limits on what percentage of each demographic could own in a neighbourhood. Lee was not ignorant of the fact that his efforts at social engineering imposed costs borne directly by homeowners. 'When a Malay or Indian is not allowed to sell to a Chinese because the Chinese quota has already been filled, the apartment invariably sells at a price lower than the market rate,' Lee wrote. However, he continued, 'this is a small cost for achieving our larger objective of getting the races to intermingle'.[64] Workable in Singapore, it is less likely to be a solution accepted in less authoritarian societies. Then again, acceptance might be forthcoming were dictates replaced with tax or other incentives promoting integration and other desirable ends.

Concluding thoughts on post-disaster relief, recovery and rebuilding

> In designing the Imperial Hotel in Tokyo, which opened in 1922, Frank Lloyd Wright and his engineer Paul Mueller put in an exterior reflecting pool that could also serve as a water source when earthquakes broke water mains needed for firefighting. [They also] exposed and suspended plumbing and electrical components instead of encasing them in walls or floors where they could be damaged.[65]
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> —Judith Rodin, *The Resilience Dividend*

63 Perlman, *Favela*, 174.
64 Lee Kuan Yew, *From Third World to First: Singapore and the Asian Economic Boom*, New York, NY: HarperCollins, 2000, 209.
65 Rodin, *The Resilience Dividend*, 33–34.

> [Following the 1995 great Hanshin–Awaji earthquake,] the most prevalent answers to the question of why citizens have not had seismic retrofitting work carried out on their dwellings [included]: Such a large earthquake will not occur again. If such an earthquake occurs again, then I will do it.[66]
>
> —City of Kobe, *Comprehensive Strategy for Recovery*

'Make the training harder than the game' should apply regardless of the type of urban disaster for which authorities are planning. A well-run exercise conducted in a major US city not too long before this book was published brought an international array of federal, state and city officials, academics and commercial-world experts together to deal with the challenges of a weapon of mass destruction attack—but the scenario left the urban area's emergency operations centre just outside the area affected by the notional blast. Exercises shouldn't sidestep the toughest challenges. New York City's former transportation commissioner Janette Sadik-Khan wrote that 'a massive contingent of [her] transportation department itself was shut out of its headquarters for nearly two months' after Hurricane Sandy thanks to it being in the low-lying confines of southern Manhattan.[67] In the early 1980s, the IDF found itself fighting in Beirut's 50 square kilometres and among the city's population of more than 1 million—an undertaking characterised by missteps and adhockery. 'The war was a disaster for Israel', one expert noted. Most of the 344 killed and more than 2,000 other Israeli military casualties were in the capital or other urban areas. The damage to Beirut was devastating. Some 17,000 noncombatants were killed, deeply wounding Israel's legitimacy among that population.[68] The Hayward Fault Zone in the San Francisco Bay Area is notorious for the number of public facilities lying on or close to it as commercial builders look elsewhere. Pipes beneath the University of California Golden Bears football stadium require regular repair as the fault's creep pulls them apart. Hayward City Hall suffers frequent cracks for similar reasons. Other facilities exposed include the Contra Costa Community College campus, the Chabot Dam and Fairmont Hospital—all of which are sure to offer significant challenges in the aftermath of a future rupture.[69]

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66 City of Kobe, *Comprehensive Strategy for Recovery*, 317.

67 Sadik-Khan, *Street Fight*, 279.

68 Charles Dick, 'FIBUA: Lessons from history', *British Army Review Special Report: Urban Operations Report 1* (Winter 2018): 10–27, at 16, 17.

69 Steven Newton, 'The most dangerous fault in America', *Earth: The Science behind the Headlines*, 9 May 2016, available from: www.earthmagazine.org/article/most-dangerous-fault-america/.

Bringing as many people as possible together to plan, practise and otherwise prepare for crisis is one of the intermediate marks on the wall at the top of which is an orchestrated effort that synchronises the many disparate efforts and objectives. That is not to say that every exercise must take on a mega-challenge like Japan's earthquake, tsunami and nuclear reactor failure trifecta of horrors. Starting small and later cranking up the challenge thermostat allow for small-lesson bites of the disaster elephant without becoming overwhelmed. Preparations will never be ideal. People move from position to position too quickly—political leaders, in particular. But establishing a progression of exercises, rehearsals and revisits to incorporate insights into plans means that adapting to the challenge will be less a panicked leap than a reasoned step. Closer ties between those responsible for megacities' security mean more people will benefit from this ratchetting up of challenges as each urban area learns from both practice and events, then shares with contemporaries elsewhere. Smaller urban and even rural areas will likewise benefit given upgrades of national urban response standards and procedures. After the debacle that was the reaction to Hurricane Katrina, US Department of Health and Human Services officials dictated rules requiring that facilities receiving Medicare or Medicaid have emergency plans and provide training in their implementation. Movement of nursing home and hospital residents when Hurricane Harvey later struck Houston, Texas, saw far better coordination of ambulances than had occurred in New Orleans.[70] Lessons had been observed and shared. Yet, the dubious performances of too many mayors, governors and federal officials during the 2020 Covid-19 crisis showed regulations, preparations, inspection standards, enforcement, leader training and cooperation have a long way to go. Readiness is never a state attained but rather a constant process.

Smart money will underlie successful recoveries both at home and abroad. Once again, lessons from smaller urban areas offer truths of value to the world's largest. Efforts to assist Iraq and Afghanistan recover from twenty-first-century economic, wartime and social catastrophes showed that the best technology might not be the right technology. We recall that ceiling fans or building design to maximise natural ventilation better link ambition to reality in Afghanistan. Building with local materials means less profit for contractors from aid providing countries but makes maintenance and

70 Philipps, 'Seven hard lessons federal responders to Harvey learned from Katrina'.

replacement easier and less expensive once NGOs return home.[71] Just as taking a breath before forging ahead during recovery helps balance short and longer-term city needs, avoiding undue haste in awarding building contracts aids in sidestepping poorly advised construction. Even locality-appropriate construction can prove ill advised if designs fail to consider full lifecycles. Apartments built for the 1972 Olympics in Munich, Germany, served visiting athletes well. Once those very fit and generally unmarried individuals had spent their few days occupying the properties, however, the tiny living spaces and awkward stairwells proved less attractive for the elderly and families having to regularly navigate them with crutches, groceries or small children. Megacities are already suffering increased frequency and severity of flooding due to climate change and accompanying sea-level rise. Coastal storms cause more damage than wildfires, earthquakes and tornadoes combined—a sobering statistic given that 17 of the world's most destructive hurricanes in history have struck since 2000.[72] Individuals responsible for megacity disaster preparedness need to recognise that history is a helpful but, when it comes to climate change–related matters, increasingly poor reference when looking forward. Developing disaster preparations based on historical norms rather than future projections assures a future of excessive losses and recovery costs in these cases.[73] A 2013 look at an area of New York City's Brooklyn identified more than 5,000 buildings in flood zones; 30 years before, only 26 were thought to be at risk. Hurricane Sandy's 2012 waters inundated areas in both Brooklyn and neighbouring Queens that were twice the size of the floodplains identified at the time of the storm's visit. Nonetheless, Sandy spared America's largest megacity from what could have been considerably greater suffering. The Hunts Point Food Distribution Center in the Bronx handled some 60 per cent of the urban area's produce and much of its fish and meat. Just as Tokyo's escape from devastation was a near-run thing, only because Hurricane Sandy struck a few hours after high tide was the food security of 22 million people never in serious danger.[74] Across the Atlantic, the Thames Barrier that was designed to protect London from flooding needed to close only

71 CALL, 'Operation United Assistance', 18.

72 Gilbert M. Gaul, 'The homes in Dorian's path are in a high-risk area. Why do they cost so much?', *The New York Times*, 3 September 2019, available from: www.nytimes.com/2019/09/04/books/review/gilbert-gaul-the-geography-of-risk.html.

73 Jonathan D. Woodruff, Jennifer L. Irish and Suzana J. Camargo, 'Coastal flooding by tropical cyclones and sea-level rise', *Nature* 504 (2013): 44–52, at 50, doi.org/10.1038/nature12855.

74 Rodin, *The Resilience Dividend*, 241.

four times between 1982 and 1990 and 35 times in the 1990s; it was closed on 144 occasions from 2000 to mid-2019. The Greater London Authority states that 17 per cent of the city is at medium to high risk of flooding; more than 1 million residents live on a floodplain. How long the barrier will be able to continue to spare London severe flooding is a matter of debate,[75] but it's a sucker's bet to put money on fewer closures per year.

A 24-hour water supply for Hong Kong's residents was recognised as unrealistic during the city's recovery from World War II.[76] Yet, 60 years later, all-day electricity for Baghdad and other Iraqi urban areas was the expectation of many despite years of sanctions and the failure of Saddam Hussein's regime to maintain critical infrastructure. It was less a failure of engineering than a case of not making it clear that such expectations were unrealistic. Authorities giving social considerations too little attention in the aftermath of a disaster risk instability. Pay government officials less than they can make in the private sector and city administrations find themselves filled with less-qualified officials or those relying on bribes and other forms of corruption to augment meagre salaries. One may view Singapore's more authoritarian approach to governing with a jaundiced eye, but the city-state's policies on pegging public salaries to those of private-sector counterparts ceased practices such as judges earning S$300,000 while the lawyers in their courtrooms earned six to seven times as much.[77] The importance of hiring qualified officials in positions responsible for disaster preparedness is hard to overstate.

Fortunately, many in the commercial and nonprofit worlds are willing to step forward as partners in readying a megacity for crises. Others will unfortunately put profit before public welfare, as was the case with a mid-nineteenth-century foreign landlord in Shanghai. His view on building: 'Within two or three years at the most, I hope to leave. What do I care if

75 David W. Chen, 'In New York, drawing flood maps is a "game of inches"', *The New York Times*, 7 January 2018, available from: www.nytimes.com/2018/01/07/nyregion/new-york-city-flood-maps-fema.html; NYC Special Initiative for Rebuilding and Resiliency, *PlaNYC*, 11, 13; 'Higher tide', *The Economist*, [London], 17 August 2019, 15–18, at 17; Carbon Brief Staff, 'Risk and uncertainty: Calculating the Thames Barrier's future', *Carbon Brief*, [London], 25 February 2014, available from: www.carbonbrief.org/risk-and-uncertainty-calculating-the-thames-barriers-future/; and Ivana Kottasová, 'Floods in London are the latest sign big cities aren't ready for climate change', *CNN*, 26 July 2021, available from: www.cnn.com/2021/07/26/europe/london-flooding-infrastructure-climate-intl-cmd/index.html.

76 Monnery, *Architect of Prosperity*, 190.

77 Lee, *From Third World to First*, 169.

Shanghai is subsequently engulfed in fire or floods?'[78] Fast forward to the twenty-first century when a Miami real estate mogul was reported to have dismissed the dangers of sea-level rise with his comment in 2016 that:

> in 20 or 30 years, someone is going to find a solution for this. If it is a problem in Miami, it will also be a problem for New York and Boston—so where are people going to go … Besides, by that time, I'll be dead, so what does it matter?[79]

Relying on responsible decisions from politicians (or, obviously, some real estate types) may prove disappointing. One author looking at the threat of disasters related to sea-level rise pointed to a harsh but unfortunate truth: 'Nobody wants to spend money to build a more resilient city because nobody owns the risk.'[80] All but the exceptional politician will seek to push expensive programs down the road while real estate developers and private property owners figure they can make their sales before the next catastrophe strikes. History provides some measure of hope. It is well known that Napoleon III and Baron Haussmann revamped portions of Paris for both civil control and aesthetic purposes. Less known: their destruction of tenements to open passageways where previously only dead-ends existed and widening of roads to create boulevards had the additional aim of reducing the spread of disease.[81] Some megacities around the world have plans to deal with sea-level rise and the related magnification of disasters' effects. Some have begun to put those plans into effect. Their residents are among the more fortunate.

78 Brook, *A History of Future Cities*, 64.

79 Goodell, *The Water Will Come*, 93; and Rene Rodriguez, 'Miami condo king breaks silence on sea level rise comment: "Maybe I had too many drinks"', *Miami Herald*, 31 May 2018, available from: www.miamiherald.com/news/business/real-estate-news/article210857319.html.

80 Goodell, *The Water Will Come*, 103.

81 'Microbes and the metropolis: How diseases shape cities', *The Economist*, [London], 25 April 2020, 78–79, at 79.

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