"CHOLERA FORCING"

The Myth of the Good Epidemic and the Coming of Good Water

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It has been frequently claimed that cholera epidemics, both in the 19th century and today, were and can be the key stimulus for procurement of safe water and sanitation, an idea that I call “cholera forcing.” "Technology forcing" refers to imposition of exogenous factors that suddenly make possible achievements that had not seemed so; cholera has been seen in this light, I argue that this view oversimplifies and underrepresents the importance of industrialization in securing water supplies. Careful study of the financial, political, and administrative foundations of such changes will be more fruitful. (Am J Public Health. 2009;99:1946–1954. doi:10.2105/AJPH.2009.165688)

“THE HORROR OF CHOLERA” drives the sanitary revolution throughout the industrialized world,” proclaimed a subhead—in capital letters and boldface—of a 2003 article in Clinical Infectious Diseases. Or, as a group of eminent cholera scientists declared in 1994, “Cholera can be a net benefit to humanity by calling attention to deficiencies in basic systems and services that need to be corrected.” When the imperative to act that cholera poses is coupled with sound science, the power of the argument is redoubled. Robert Koch, in the Hamburg, Germany, cholera epidemic of 1892, proved beyond a doubt what John Snow had proved beyond a doubt four decades earlier: “[T]he reason people get cholera is straightforward and completely preventable: ingestion of feces in contaminated food and water. … The basic provision of clean water and sanitation works.” Henceforth, it was believed, cholera would not only produce action, but right action.

“Cholera forcing”—the idea that cholera “forces” beneficial changes in public health—is probably the best-known case of the myth of the good epidemic: public health infrastructure is inadequate; sooner or later an epidemic arrives and flourishes in these foul conditions; then, technological changes that had not seemed possible become imperative. “No more!” people say, “We have erred, but we learn.” Thus, the arrival of epidemic cholera in 19th-century Europe and North America has been seen as responsible—at least in some senses—for public sanitation systems: public supplies of pure water, water-closing, sewers and sewage treatment, and, more broadly, a sanitary revolution in which the environmental causes of epidemic disease are appreciated as a public responsibility. Cholera teaches “hard lessons,” an editorial in the New England Journal of Medicine proclaimed: “[W]e must increasingly relearn that no one should lack access to basic clean water and sanitation.”

Especially given the frustrations of achieving adequate water and sanitation in much of the world, it has been tempting to extrapolate from that portion of the past. As Tauxe and colleagues write, “Just as cholera spurred the sanitary reform movement and the development of the field of public health in 19th-century Europe and North America, recurrent epidemic cholera will continue to drive constructive change in the developing world.”

Cholera forcing has been one of the most conspicuous cases in public health of applying history to policy—or, perhaps more accurately, appealing to history in political conversations. Most historians, however, both of cholera and of infrastructure building, do not accept the generalization that cholera forces sanitation (more did accept it at one time, and historians bear some responsibility for putting it into play). One could ask many questions about the bases of that conclusion and what notions of technological dynamics they embody, but almost everyone agrees that urban water and sewage systems are a moral good (although Briggs and Martini-Briggs challenged
some of the premises of this claim). If we can transform historical generalizations into self-fulfilling prophesies, and use threats of disease to scare ourselves into achieving those goods, it matters little if the historical generalization is unsound. It is better, maybe, not to inquire too carefully. But I think the costs of indulging oversimplification outweigh the benefits of a more-qualified look.

The most recent spate of assertions of cholera forcing began in the 1990s. A number of factors were probably responsible. One was the increasing unacceptability and unreliability of coercive approaches to cholera control, which often discriminated by race and relied on isolation and prevention of movement. Another was awareness of the growing problem of deteriorating or inadequate colonial-era infrastructure in many cities in the face of rising demand and often against a heritage of inequitable distribution and contested issues of acquisition and pricing of water and sanitation. One senses both impatience in trying to address this problem through the gentle coaxing of the community process and frustration with the inertial bureaucracies of failing states. But precipitating factors were the conjunction of structural adjustment, with its apparent demand for the tactical (if not strategic) abandonment of public sanitation and repudiation of public health priorities, and the rising terror as cholera hit the beaches of the Western Hemisphere.

One response was an assertion: that cholera had been, must, and would be a stimulus to sanitary reform. Nineteenth-century Europe (chiefly England) and North America would be the model; the disease-driven dynamic would apply in the future as it had in the past. The implicit (sometimes explicit) target of much of the cholera forcing rhetoric of the 1990s was the Americas. Cholera’s return to the Americas—particularly to the west coast of South America—in the early 1990s was unexpected. Latin America’s status was ambiguous: did one assess it by developed- or developing-world standards?

Notwithstanding Gabriel Garcia Marquez’s novel Love in the Time of Cholera, cholera had been relatively rare in 19th-century Latin America. Now there was concern that it might become endemic there as it had been in south Asia and was becoming in Africa. To frame Latin America’s cholera history in terms of North America’s and Europe’s was on the one hand to recognize that it could be redeemed—unlike in sub-Saharan Africa or south Asia, where cholera was, at best, simply controlled by oral rehydration, antibiotics, and vaccination. To protect North America, however, it was also necessary to command that redemption. One recent evocation of cholera forcing is expressed in American terms: “Cholera continued to rage until the leaders of the sanitary revolution eradicated it from the Western Hemisphere in 1887. Their victory held for almost a century.”

Moreover, studies of the origins of sanitary infrastructure, and of urban water supplies in particular, were increasingly finding only a tenuous relation to public health concerns. In early 19th-century New York, investment in a waterworks company was a route to capital accumulation that circumvented banking laws. Fire protection had long been a central rationale for urban water supply, and became more so with the flourishing of a fire insurance industry that coordinated pressure for provision and distribution of water. Historians of technology tracing the origin of the piped city attributed it to a general “modernization” or to consumer or industrial demand. They also noted that, outside of a few great cities, this technical achievement had come rather more recently than a cholera-as-cause model would suggest: it was a matter less of the 19th century than of the first half of the 20th.

Industrial needs and consumer desires underwrote water acquisition campaigns even where the supply of water would ostensibly be public. In 1888, the economic historian John C. Brown measured the strength of several hypothetical determinants of the acquisition of urban water supplies in 2 sets of German towns during the key period 1873 to 1883. Among these determinants were the median income of voters, industrial demand, bureaucratic capacity, and 2 health-related variables—population density and number of cholera epidemics. Brown found that the health determinants were minimal compared with industrial

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needs and prosperity. By one measure, the combined health variables determined 2% of the supplying of water to Duisburg, one of the least healthy towns; at best, the public health variables accounted for a fifth of the effect.11

Relying on the post–World War II historians of British public health, Brown had been willing to make an exception for Britain. There, perhaps, public health–based state mandates (often undertaken in the wake of cholera) might have been sufficient for the provision of waterworks. But historians working on Britain were finding that there, too, industry and consumer demand were key factors.12 Although deadly disease was one of the arguments habitually used to assail the suppliers of water, matters of cost and service, the intriguing possibility of cheaper alternatives, and the exercise of political power were more prominent; such was the conclusion, more than a century ago, of Arthur Silverstone, shrewdest of the 19th-century commentators.13

More recently, sociologist Ben Crow has reached the same conclusion for those parts of the developing world where sanitation programs have been reasonably successful. Comprehensive waterworks in Asian cities have come in conjunction with industrialization, which brings both a demand for water and a wage basis to pay for it.14

Yet there were blind spots even in these more mixed assessments. Revised assessments of public health provision as exemplified in northwest Europe did not mesh especially well with assessments of the problems that sanitizing cities were encountering in many parts of the world. First, water provision was sometimes, usually implicitly, presented (or taken) as a proxy for the several sorts of integrated sanitary infrastructure—waterworks, water closets, drains, sewers, and sewage disposal works were part of a single system. The water-based “sanitary idea” of 19th-century sanitary reformer Edwin Chadwick invoked the very logic of technical systems elucidated by Thomas Parke Hughes, an eminent historian of technology. Clearly, if water were brought into a city and ramified throughout it, that water, sullied by urban “offscourings,” had to be collected and disposed of. If another downstream city wished to use that water for the same purposes, that system must include purification as well as recovery. Hence, even if the initial motives for supplying water to a city were industrial rather than hygienic, a technological determinism would kick in: the fact that water runs downhill, dissolves or carries anything that can be made accessible to hydraulic transport, equally the fact that these transported matters can then be made to separate from water through a mix of physical, chemical, and biological processes, should lead inexorably to piped cities.15 Indeed, the assumption of an integrating hydraulic holism was quite as strong as the assumption of a rational response to cholera.

In fact, this sanitary idea has expanded, contracted, and evolved. In its initial 19th-century conception, wastewater purification was a low priority, and originated more in terms of the profitable recovery of nutrients than the reclamation of potability. Water, drainage, and excrement-disposal technologies were frequently adopted separately. They sometimes converged, but not necessarily quickly. In Britain, some of the towns with the best supplies of water were the slowest to adopt water-closeting (inadequate means of wastewater purification was one factor). Complaining that, when lumped together with water supply, excrement disposal gets insufficient attention, some recent commentators have begun to insist on the separation of the two problems.16

They appreciate that, for much of the world, water-based sanitation is either not an option or not a good one: it is unrealistic, imprudent, or both.

Second, it was still often assumed that “water supply” meant “public water supply,” and that “public” implied both equity and accountability. Water—and the rest of the accompanying sanitary infrastructure—would sooner or later become universally available to all urban residents. In studying water provision in 19th-century Britain, historian John Hassan17 was in good company in making the municipal takeover of a waterworks a central question. Water provision, after all, was part of social progress: the recognition by governments of human necessities, one of these being the protection of the public health against cholera.

In fact, it did not follow that municipal waterworks were invariably well-run or able to supply the needs of all potential users. Nor were heavily regulated privately owned waterworks very different from municipal waterworks. Both were usually monopolies, more or less accountable, and both were funded by the private capital market. Yet the public–private question did (and still does) generally deflect attention from painstaking reconstruction of the conditions of service—who was being supplied with what, and at what cost—a matter that
has been of much greater interest to contemporary scholars of urban water in the global south.

Complications, qualifications, reservations, and ambivalence are evident in many recent articulations of cholera forcing. Gangarosa and Tauxe see “repeated cholera epidemics” as forcing “investment in basic public health” infrastructure, but they appreciate that cholera provides only an “opportunity” for such action or a means of “leveraging” issues onto the public agenda. It can “persuade decision makers who control purse strings to reorder priorities and make the commitment of resources needed to correct the root problems.” These “root problems” might include poverty itself, although more often poverty is understood as a background condition within which any infrastructural reform must take place. In 1998, Gutiérrez et al. made cholera forcing a contingent matter: “In Mexico, cholera proved to be an ‘ally’… this may not always be the case.” In his 2006 editorial in the New England Journal of Medicine, Richard Guerrant of the University of Virginia’s Center for Global Health referred to “the disturbing failure of cholera to drive a sanitary revolution throughout the world, as it first did more than a century ago in Europe and North America.” In the 19th century, “fear of cholera clearly [had] led to the sanitation revolution in Europe and North America,” but in the developing world it was leading only to oral-rehydration therapy and a disturbing reliance on antibiotics, against which *Vibrio cholerae* was rapidly evolving resistance.

A more positive analysis came from Mexico in 2006, but its focus was distinct from the older cholera forcing claims. “Cholera in Mexico: The Paradoxical Benefits of the Last Epidemic,” by Sepúlveda et al., reviewed the decade 1991 to 2001. They found reason to celebrate: cholera remained sporadic; surveillance worked; the government was able to control panic internally and externally. Although the authors mentioned in passing efforts to chlorinate water (at public and household levels) and to restrict wastewater irrigation of edibles, and observed that cholera epidemic coincided with a federal effort to increase access to safe water, they emphasized factors other than infrastructure: adequate diagnostic institutions, swift isolation, comprehensive health education, and widely available care. They further maintained that the “benefits of the cholera epidemic”—particularly in terms of awareness of causes of fecal-oral disease and surveillance-and-response infrastructure—persisted after the epidemic, and were evidenced in lowered childhood diarrheal mortality.

**COMPLEMENTARY FACTORS INFLUENCING INFRASTRUCTURE DEVELOPMENT**

These reservations suggested that the standard claim of cholera forcing needed to be complemented with three other fundamental—and probably obvious—factors: money, politics, and administrative stability and expertise, not only in epidemiology and sanitary engineering but in law, finance, and accounting. These factors merge, but it is worthwhile giving attention to each.

**Money**

Writing in 1992, Gangarosa and Tauxe appreciated the high cost of sanitation in Latin America. Yet they held that a full-scale cholera epidemic would be an economic disaster, and that sanitation must be seen as a long-term investment. This led to recognition of cholera’s leveraging role. To an administration faced with balancing competing demands for limited funds, a cholera emergency will draw greater attention to investment in water and sanitation prevents. Briggs and Martini-Briggs countered that “the notion that Latin American governments could freely choose whether to spend public funds in this fashion was largely illusory.” Both sides were critical of the structural readjustment ethos that blocked such investment, but Briggs and Martini-Briggs went further in questioning large-scale responses.

Although invocations of the cholera-forced sanitary investment argument appear to rest on claims about what would be rational for a state to do, they are clearly written not from the standpoint of governments, but from that of a sectoral interest group that hopes to push or pull governments to address its concerns. The assertions may recognize that water and sanitation infrastructure will protect against other waterborne diseases; they may appeal implicitly to the old Chadwickian idea of cascading social and political benefits in self-image and loyal citizenship. But these generic calls for investment rarely come with price tags or financing plans. Questions of whether infrastructure-based cholera prevention should trump efforts against other diseases are asked, but in other settings, Questions of where sanitary infrastructure ranks against other public goods, such as education, transport, or law enforcement,
Contemporary cholera denial is so rampant that in this age of information most authorities estimate that WHO figures include fewer than 10% of cholera cases—perhaps as few as 1%. An informal system for compilation of cholera statistics that circumvents state bureaucracy has evolved.

Partly because of the high cost of sanitation, the response of governments to impending cholera has often been to deny it, rather than grudgingly paying for unaffordable sanitation. For historians, “cholera denial”—in which officials either hide the magnitude of deaths from cholera or attribute them to other causes—is typified by the cholera epidemic in Naples in 1911, but there were many other examples of cholera denial in the 19th century. Contemporary cholera denial is so rampant that in this age of information most authorities estimate that WHO figures include fewer than 10% of cholera cases—perhaps as few as 1%. An informal system for compilation of cholera statistics that circumvents state bureaucracy has evolved.

In the cases of diseases more clearly linked to individual behavior (e.g., sexually transmitted diseases), public health workers have generally turned away from moralistic and accusatory strategies. Using such a strategy in the case of cholera—depicting the state as an Augean Stable in need of the fundamental changes that cholera forcing historically supplied—is unlikely to be well-received, no matter how accurate. This finger-pointing version of cholera forcing—assertion of guilt with demand for confession and expiation—as opposed to the rational-response version may not by itself trigger cholera denial; however, it also does not lay a foundation for any pragmatic positive response.

Again, it is worthwhile to return to the cholera interventions highlighted by Sepúlveda et al. They refer to the “operationalization of a new public health policy spanning multisectoral activities, involving community participation [and] political will.” These were not a massive infrastructural revolution; they may constitute a single “policy” only in retrospect. Rather, Sepúlveda et al. describe an array of modest and targeted social and technical programs, undertaken in conjunction with a variety of public and civil society institutions. The denial option was largely avoided.

Yet it will not do to reject finger-pointing politics out of hand. It would be naïve to assume that by transcending the tumult and shouting, we reach an apolitical sphere of pragmatic response. Packard et al. have demonstrated powerfully and disturbingly that we live in a world where diseases require lobbyists and marketing campaigns if they are to be taken seriously. Sepúlveda et al. include “political authorities” in their list of institutions that needed to be “trained.”

**Politics**

One expression of cholera forcing appeals to democracy as a vital element in the production of sanitation. As Tauxe and colleagues wrote, “Just as cholera spurred the sanitary reform movement in 19th-century Europe and North America, epidemic cholera is likely to be less and less tolerable in the growing democracies of Latin America.” Together with reliance on public participation through appeal to civil society or community, democratization figures regularly in contemporary discussions of public health improvements in the developing world. Yet why democracy is to be the magic bullet is rarely made clear. Italy’s denial of the existence of cholera in 1911 was the act of a liberal democratic government.

Democracy covers a multiplicity of institutions, with different degrees and kinds of representativeness, engagement, and accountability; so too, of course, do civil society and community. Differences in suffrage laws may exclude from public decision making those most likely to be cholera’s victims. Even if democratization does make epidemic disease less tolerable, that does not mean that it will automatically conduce to an effective response. I know of no good comparative study, but historically, the record handling cholera and, equally, the construction of cholera-preventing infrastructure by democratic governments appears to be a mixed one, subject to many complicating factors.

A key question is what to expect from different levels of democratic institutions. Generally, surveillance- and movement-based
cholera control has been the work of nation-states, whereas sanitary infrastructure has been the responsibility of local governments—as, in practice, has been the practical response once an epidemic has broken out. The predominant political problems have been depicted quite differently at these levels. At the macro level, reasons of state—invoking international complications or complicated regional and sectoral interests—may combine to subvert adequate attention. At the local level, sheer fear of action may combine with numerous sources of incapacity of effective public action. In Two Years Ago (1856), the best novel about cholera, Charles Kingsley describes the meeting of the Aberalva parish vestry to respond to cholera. Everyone must have a say; comments are ill-informed and digressive. Often, they are seen as objectionable by others. The meeting degenerates into petty squabbles, reflecting the ancient grudges that fester in a small community. It may be important for people to feel that they have been heard, but the downside of a relationship and it is hard to see how could be avoided. The pricing of utility services has also been an unavoidable issue, not just for water and sanitation systems but also for gas and electricity supplies. Industrial interests may conflict with those of individual citizens and with the goods of public health. Individuals may end up subsidizing industrial users. Negotiations may not lead to outcomes that are fair, nor do they necessarily generate efficiency, stability, comprehensiveness in planning, or even accountability. But that does not disguise the necessity of the coalitions.

Whatever its sources and motivations, leadership and perseverance are central and underrecognized factors in water and sanitation systems. But if leadership requires the continuing gift of legitimacy, that gift is not an automatic attribute of democratic institutions. The massive Vyrnwy reservoir and aqueduct, designed to supply water to Liverpool, England, had taken almost 20 years to plan and build when it came on line in 1892. It represented the ambitions of the civic leaders of a wealthy port and reflected trust between elected government and municipal civil servants in engineering and public health. There were numerous trials and setbacks during those years. In 1885 and 1886, as it became clear that the cost would be roughly double what had been projected, a squabble arose between the two engineers managing the project—Thomas Hawksley, an eminent private-practice engineer who did the initial plans, and George Deacon, Liverpool’s own full-time engineer, who was overseeing construction. Members of the Conservative minority in the municipal council, taking advantage of the dispute, tried to get the project reassessed or possibly halted. What is striking is the unanimity of the Council’s Water Committee. Its core leadership had been working with Deacon for years, week after week drawing on his expertise in making detailed technical decisions. Committee loyalty trumped party loyalty, and the members hunkered down, weathered the storm, and built the works.

It seems plain that the committee members became personally invested in the project. That sense of ownership, translated into leadership, transcended democracy. One might represent these events as regulatory capture, in which the agents of
oversight of a democratic polity are co-opted by those they are to oversee (a sort of technological Stockholm syndrome). Such a view, however, would be creating an illusory division between policymaking and policy implementation. From the committee’s standpoint, its close involvement in detailed issues of construction was still a policymaking role: the careful administration of public monies to achieve public ends. Is democracy important to this achievement at all? If it is, it is chiefly in creating a climate of public engagement, which provides a context for long-term and labor-intensive commitments like those of Liverpool’s Water Committee members, or like those who have been involved in the Orangi Pilot Project in Karachi, Pakistan, often held up as an exemplar of successful community-based sanitation of a shantytown in the context of creating a wide array of grassroots community services. Accounts of Victorian sanitary works projects regularly allude to spasms of protest from opposition economy parties, who would discover some scandalous lack of accountability in public expenditure and parlay that into electoral success. Often, however, once in power, they too recognize the problems, take up the public projects, and become fixated with the hard work of responsible expenditure, only to become targets for the next wave of economizers.

One should not romanticize. There are layers and layers in these local politics; networks of administration are networks of power, if often of contested power. As often as not, however, the most conspicuous trappings of democracy are expressed against, not for, such improvements. From the point of view of technological achievement, grandstanding democracy or calls for change may well be an irritating distraction in matters that involve painstaking detail, the acquisition of expertise, and perseverance in the face of cost overruns (Liverpool’s experience was far from rare; cost overruns were often significantly higher). Silverthorne concludes that if Victorian urban electorates had known what lay ahead, they would not have embarked on water and sanitation works.

**Expertise**

Beyond money and determination lies the mediating expertise that will ensure money is well-spent and achieves desired public ends. Much criticism of developing-world sanitation has been directed at civil servants. Works built with foreign aid are not well run or maintained, it is complained, and do not last. The results may be catastrophic. In situations of unreliable (or unaffordable) administration, according to Gangarosa and Tauxe, “large urban water systems may function as efficient distributors of contaminated water,” and are the more dangerous the more they are trusted to be safe. Moreover, announcement of the unreliability of a water supply in which a community has invested hard work and money may be “politically explosive.” Only recently have there been concerted calls for investment that underwrites maintenance, if not management.

Nineteenth-century cases do provide exemplars of the ongoingsignificance of a well-trained municipal civil service equipped with the materials and tools able to do its job. The city of Liverpool, George Deacon’s employer, was a pioneer in the professionalization of municipal civil service. It appreciated that the onslaught of technical minutiae confronting a large modern city required sustained expert attention and corresponding investment in good equipment and materials. Deacon led the Water Committee in matters of cement quality, the strength of building stone, and the stability of supported slopes. All these, and good workmanship, made a difference.

Analogous issues arise in the better-known case of Robert Koch and the Hamburg cholera epidemic of autumn 1892. Koch’s analysis of this epidemic, along with John Snow’s of the 1854 cholera epidemic in Soho and south London, England, has been emblematic of science-based public health.

The 1892 epidemic was largely confined to Hamburg. Its neighbor, Altona, Germany, remained almost entirely cholera free. Altona had invested in filtration; Hamburg had not. Thus, science shows that large-scale waterworks prevent cholera. But a fuller reading could make an equally powerful case both for expert administration and for more modest and realistic expectations of it. In the winter of 1893, after the Hamburg cholera epidemic was over, Altona experienced a much smaller outbreak. Koch, who had praised both Altona’s initiative in building a filtering plant and its administration of those works, reflected on what had gone wrong. He juggled 4 variables: (1) the degree to which cholera (and typhoid) were in fact waterborne diseases, (2) the adequacy of bacterial culturing to monitor filtration quality, (3) the degree to which the filters could be managed, and (4) the changing state of raw water (which included highly contaminated ebb-tide Elbe water) and its potential to become microbe free. Knowing when a filter was not working well would allow one to put water through a filter that was, but great harm could come from only a brief failure. Frequent monitoring might be possible, but continuous monitoring was not, and, Koch wrote, “even with our best filtering arrangement … we cannot keep back all microorganisms.” The Altona technicians were well-trained and diligent, but that might not be enough.

Although the coming of chlorination would solve Koch’s problem, it has left others—supplies of chlorine, functioning pumps, mains that don’t leak, sanitary households and cleanly habits.

**CONCLUSION**

Can cholera force sanitation? The opportunity cholera affords may be real. Crisis, however, is no adequate basis for works that are expensive, require the coordination of a wide variety of technical skills over an extended time, depend on continued public support, and need to be entrusted to well-trained and reasonably compensated experts backed by adequate budgets for supplies and tools—and that, even then, may not always work. Cholera may be dealt with by vaccination and oral-rehydration therapy, but given all the other healthy benefits of good water, it would be absurd to retreat from what historically has been a central focus of public health.

Reliance on epidemic crises to make us do what we cannot find a way to do otherwise is remarkably similar to appealing to that other great agent, the market. It too, it has been argued, will operate...
automatically to ensure that a necessity—water in this case—reaches those who need it in the most expeditious way. These are polar-opposite myths—the former overlooks the problem of who will pay to staunch cholera; the latter ignores that fact that, however much we may declare that water (or, for that matter, sanitation) is a necessity for which people will pay, these goods will not necessarily be bought in ways that will secure the general public’s freedom from waterborne disease.\(^\text{92}\)

The panacea of privatization, too, is increasingly seen as a mirage, and not only for reasons that might have been predicted by economists (e.g., the inefficiency of competition in water delivery). Both markets and cholera forcing seem a misplaced investment of hope, for the operation of each relies on institutions of the state (including the local state) and civil society. Disease threats can stimulate public responsiveness only where a foundation already exists. What Sepúlveda et al. showed us is not so much that cholera per se effects change as that the Mexican health system had the flexibility and capacity to adapt to meet a new disease threat.\(^\text{93}\) Where that capacity (or willingness) to respond does not exist, as in parts of Africa, cholera flourishes.

The interplay of deadly waterborne disease and effective response in the 19th century does provide lessons, but they are complicated and enigmatic. Unlearning is at least as important as learning. At the risk of obviousness, it seems worthwhile to underscore three points.

First, expectations of comprehensive networks in which all are “sanitary citizens” through access to some common public technologies are grounded in the experience of prosperous and well-watered places of the 19th- and 20th-century industrialized world. They should be seen as a result of the confluence of multiple—and possibly transitory—historical factors. They may remain desirable goals. Whether they are unrealistic, they are certainly hard to realize and cannot be regarded as the default end stage of sanitary evolution.

Where they work, they build on a substrate—rule of law, general means of conflict resolution, administrative potency and competence, and that mysterious entity, social capital (or, equally, social control), which represents the investment of ordinary citizens in these institutions. These in turn are affected by broader structural factors: relations between cities and hinterlands, industry and agriculture, capital and labor, and degrees of inequality. All factor into provision of water and sanitation, which should not be thought of as problems that will be solved once and for all but as domains requiring repeated periodic reinvestments of attention, energy, and money.

Second, a city-by-city review of the histories of water and sanitation suggests underappreciation of the unique in the pursuit of policy-relevant generalization and theory. Both cholera forcing and markets appeal to the rational response of two macro-units: publics and polities. Both assume the interchangeability of human agents and overlook the profound inertial impact of the past, of culture, and of all else that eludes objective definition and prediction. Yet people who play important and irreplaceable roles in the water histories of many cities are often people with ethnic and class identities and long, accurate memories, who live within complicated social networks and possess varying degrees of commitment, unique technical skills, and even different degrees of charisma. The leaders of the Orangi Pilot Project, no less than Liverpool’s Water Committee, are reminders of these truths. To the degree that leaders are central, they are sociologist John Law’s “heterogenous engineers,” who amalgamate whatever skills are needed to pull off major projects.\(^\text{94}\) But groups, with their own unique dynamics and sometimes unstable alliances, are no less important.

Third, it makes a difference how we label and categorize water—either as a necessity in the maintenance of ordinary health and the avoidance of deadly disease or as a commodity, the market for which must be allowed to operate. I prefer one of the tropes of the 19th-century sanitary revolution: water as gift. It is among many collective gifts we regularly give one another in constructing civil society. Such gifts are both recurring behaviors—from respecting one another’s dwelling and personal property to obeying traffic laws or bagging dog droppings—and part of the public built environment—for example, drained and paved streets as well as waterworks, financed by the willing donation of local taxes.

Historically, as the ornate fountains in many cities reveal, water’s status as gift has been hard to miss; if we still enjoy the fountains, we easily forget that they were once functional water supplies as well as aesthetic creations. But necessity diverts attention from the choice to give, and, aside from overlooking the fact that water is a public good, commodity distracts us from the fact that no one really is a free chooser in its purchase. On the other hand, as anthropologists have long pointed out, gifts cement societies. Made in and by a public, they cannot be summarily refused, for giving and receiving are at the core of identity. A common health is the greatest of those gifts. Deadly and preventable disease may highlight the need for the gift, but cannot cause it to be given.

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Endnotes


17. Hassan, History of Water in Modern England and Wales.


