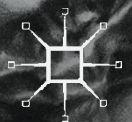


Critical Criminological Perspectives

Water, Crime and Security in the Twenty-First Century

Too Dirty, Too Little, Too Much

Avi Brisman, Bill McClanahan,
Nigel South and Reece Walters



Critical Criminological Perspectives

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‘Water is the essence of life. Is it any wonder then that it is at the heart of so many contemporary social conflicts? This fascinating, timely and troubling book casts a critical lens on the power, interests and social forces that are presently determining the quality, quantity and availability of fresh water worldwide. The authors persuasively argue that water is and ought to be a basic human right, precisely because it is essential for everyone, everywhere.’

—Rob White, *University of Tasmania, Australia*

‘It took too long for a book which considers how much of the water landscape is riddled with criminal activities, harm and serious security issues, but now it is here. This is a must read for those who work on the relationship between water and social justice, and seek to find ways to fight for a more just hydro-social system.’

—Professor Erik Swyngedouw, *Department of Geography, University of Manchester, UK, author of Liquid Power and Social Power and the Urbanization of Water (MIT, 2015)*

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1

Introduction

In the children's book, *11 Experiments That Failed* (Offill 2011), a young girl poses the question, '[c]an a message be sent in a bottle to a faraway land?' Her hypothesis is that '[t]he hole in the bottom of the toilet leads to the sea', and she sets out to test this by placing a message in a bottle and seeing what happens when she flushes it down the toilet. The following page reveals an illustration of the girl's house with water pouring out of the windows and the girl adrift on a toilet seat. Bobbing next to her is a potpourri of household items.

The girl's astonished mother, calf-deep in water, clutches a cordless phone. The only text on the page is as follows:

What Happened:

- Toilet overflowed.
- Plumber called.
- Still awaiting rescue.

While the story is fictional, the image is far from fantastical. And while the girl's hypothesis proves incorrect under the conditions of her experiment, she might have encountered different results in another location.

In the weeks prior to the 2016 Summer Olympics (officially known as the ‘Games of the XXXI Olympiad’ and commonly known as ‘Rio 2016’), which took place from 5 August 2016 to 21 August 2016, a number of media outlets reported on the water quality of Rio’s Guanabara Bay, the site of competitions in marathon swimming, sailing and windsurfing. Writing for *The New York Times*, Jacobs (2016: B9) described ‘a veritable petri dish of pathogens . . . from rotaviruses that can cause diarrhea and vomiting to drug-resistant “superbacteria” that can be fatal to people with weakened immune systems’. Dr Daniel Becker, a local physician, warned that ‘[f]oreign athletes will literally be swimming in human crap, and they risk getting sick from all those microorganisms’ (quoted in Jacobs 2016; Ward-Henninger 2016; see also Editorial 2016). Apparently in Rio, inadequate infrastructure meant that in some cases, ‘the hole in the bottom of the toilet’ did indeed lead to the sea.

Back in 2009, when Rio won the bid to host the Olympics, Brazil promised that 80 per cent of the sewage that flowed into the bay would be treated by the start of the Games, and the country pledged \$4 billion to meet this goal (Branch 2016; Editorial 2016; Jacobs 2016). While the 80 per cent benchmark proved difficult to quantify, in the end, Brazil spent just \$170 million, most of which was used for trash-collecting boats and portable berms to block sludge and debris, but which did little to stop bacteria and viruses from flowing into the bay (Editorial 2016; Jacobs 2016). As Branch (2016: 51) described, officials ‘strapped “eco barriers,” giant strainers to hold back the garbage, across some rivers and employed “eco boats” to trawl the bay closest to the venues, scooping up all visible trash, most of it plastic bottles, bags and diapers’. This strategy—one commonly employed in the face of environmental problems—is known as ‘out of sight, out of mind’ (see generally Brisman 2014; Walters 2014; Wyatt 2014).

To be fair, as Branch (2016: 50) explained in an article published days before the opening ceremony, ‘[e]very two years, alternating between winter and summer, the Olympics bring international scrutiny to a host city. Promises made at the time that the bid was awarded, years earlier, are scoured to see if they were upheld’.¹ Thus, the microscopic examination that Rio underwent was not an anomaly.² Sadly, neither are the conditions of its waters: much of the sewage and trash generated by the region’s

12 million inhabitants continues to flow untreated into Rio's waters (Editorial 2016; Jacobs 2016)—making Rio rather *similar* to many other regions of the world.

Depending on the source, between half a billion and two billion people around the world lack safe and adequate drinking water, and more than two and a half billion people do not have access to improved sanitation facilities—a problem that threatens the quality of existing water supplies (Arnold 2009; Cohen 2016; Fonjong and Fokum 2017; Meisch 2016; Sarni 2015; Schriever 2013; Witt 2011)³ and one that has, depending on one's perspective, either been *exacerbated by* or *contributed to* the global trend of privatizing public water supplies and infrastructure (see Arnold 2009; Fonjong and Fokum 2017; Chapter 5). According to Jon Freedman, leader of Global Partnerships and Government Affairs for General Electric Co.'s water business, 'the world's reached a tipping point where demand for water is now greater than supply, and I think we're actually seeing this play out across headlines all over the world. You know, we've seen this in Brazil. The taps are literally running dry in Sao Paulo. We're seeing it in China and even here in the U.S. in California' (*OnPoint* 2015). Similarly, Will Sarni (2015), Enterprise Water Strategy Consulting Leader of Deloitte Consulting LLP, states that '[t]here is a projected 40 per cent gap between water supply and demand, assuming business-as-usual practices . . . driven by global trends such as increasing population and the rise of the middle class, coupled with increased demand for food and energy'.⁴ Recent studies show that nearly one-third of the world's 37 largest aquifers are being drained faster than they are being replenished—aquifers that happen to be concentrated in food-producing regions that support close to two billion people (Barringer 2015).⁵ To further complicate matters, water shortages have a disproportionate impact on women, who often spend hours each day searching for water for their families (Arnold 2009; Cohen 2016; Naiga et al. 2017; see also Furness 2010: 190; see generally Kimmelman 2017; Yee 2016)—a point to which we will return in Chapters 3 and 5. As such, it is rather unsurprising that the World Economic Forum described water issues as being among the top three risks facing the planet and global society. Summarizing the World Economic Forum's Global Risks report of 2014, Walton (2014) of the international water charity and science reporting agency, Circle of Blue,

wrote: ‘Too much, too little, too dirty. For the third consecutive year, reckless use and abuse of water is seen by global authorities as having the potential to seriously disrupt social stability, upend business supply chains, imperil food and energy production, and generally make life miserable for billions of people’. In 2015, the World Economic Forum ranked ‘water crisis’ as *the top* risk (Hinckley 2016; http://www3.weforum.org/docs/WEF_Global_Risks_2015_Report15.pdf).

This book attempts to address some of these issues and challenges and provides criminology’s first book-length contribution to the study of water and water-related crimes, harms and security in an effort to produce a comprehensive criminological overview of the contemporary and historical relationship between water and crime. Our principal focus here is fresh water but of necessity this must also embrace consideration of the sources of fresh water and the destinations of used and waste water, the ‘inflow’ from the sky, springs and rivers (pure or polluted), and the ‘outflow’ into sewers, onto fields and into coastal marine systems. The book therefore draws a (permeable) line around the system of fresh water origins, uses and disposals and the dependent ecosystems.

Chapter 2, *Too Dirty: Water and Pollution*, discusses water pollution as a global problem with regional and local manifestations. Water pollution, whether from point sources (e.g., the Deepwater Horizon oil spill in the Gulf of Mexico in April 2010) or non-point sources (e.g., quotidian stormwater runoff), exhibits local, national, regional and global dimensions and constitutes one of the most pervasive threats to global ecological health (see Carrabine et al. 2014: 402–404; White and Heckenberg 2014: 158; see generally Brisman 2002). For example, freshwater animal species face an extinction rate five times that of terrestrial animals because of the extent of water pollution and overfishing (Harwood 2010). In this chapter, the examples mentioned above and other instances and forms of water pollution are examined and described. The goal is to understand the history, causes and consequences of water pollution with particular attention to the ways in which various socio-economic practices lead to this particular form of environmental destruction and degradation.

In Chapter 3, *Too Little: Water and Access*, we turn our attention to issues of water availability and access in both the Global South and Global

North. Insufficient availability of and inadequate access to safe and sanitary supplies of fresh water causes over 3 per cent of all human deaths worldwide and is the leading cause of death for children under the age of five (Prüss-Üstün et al. 2008). Developing nations are particularly at risk of facing insufficient availability of, and access to, clean water (see, e.g., LaFraniere 2006); such problems are less likely to impact the developed and post-industrial world unless they affect agricultural production or recreation (although ongoing dry conditions in the western United States is beginning to change this perspective). This chapter describes issues of water availability and scarcity brought about by climatic shifts, commodification, conflict, pollution, privatization, and political and economic change. The chapter concludes by examining linkages between water scarcity, crime and conflict, and how they emerge.

Chapter 4, *Too Threatened: Water and Climate Change*, brings together some of the issues presented in the first two chapters by exploring how anthropogenic climate change will create both areas of drought and (over)abundance. Because of the effects of a changing climate on water—effects in the form of drought and flooding and otherwise shifting levels of clean and accessible water—there is a distinct need to develop understandings of the coming intersections of climate change, crime and water. This chapter extends existing criminological understandings of climate change by focusing on the ways that water pollution, differential water access and water-related crime will likely be recast as climate change continues. In other words, the harms associated with climate change may become, or contribute to, water crimes and vice versa (see Kane and Brisman 2014).

In Chapter 5, *Too Costly: Water and Privatization*, we consider the unsustainable and exploitative use of scarce global resources of fresh water. Instead of witnessing nation-states adopting more equitable and efficient conservation strategies, powerful corporations have been permitted to privatize and monopolize diminishing water reserves based on flawed neoliberal assumptions and market models of ‘the global good’. The commodification of water has enabled corporate monopolies and nation-states (with varying degrees of corruption) to exploit a fundamental human right. This chapter thus explores the ways in which corporate power, supported and sponsored by government initiatives and legal

frameworks, monopolizes an essential global resource with devastating environmental and human consequences.

Chapter 6, *Too Insecure: Water and Security*, explores water and water crime in the context(s) of the increasingly powerful discourse(s) of security and securitization. Because water has long been tied to conflict (e.g., historically, during the westwards expansion in the United States, and contemporarily, in the ongoing armed struggles for control over water supplies in Iraq and Syria), we recognize it as a material need that frequently contributes to or drives conflict. In the post-9/11 world, however, water is increasingly taking on new discursive and material roles and dynamics in global conflicts. Critical security scholars (Wall 2013; Neocleous 2008) have noted the ways that political and cultural calls for increased security lead to problematic processes of securitization that frequently serve to increase the power of elite state, corporate and cultural actors. As climate change (the subject of Chapter 4) continues to impact water quality, availability and accessibility, calls for increased water security have become louder and more frequent, and are likely to be increasingly answered by military means. Demands for water security in turn demand that we ask important questions: What exactly is being secured? *From whom* (or *from what*) is it being secured? *For whom* is it being secured? Is water security a zero-sum game or can cooperation help bring about water security?

Because of water's status as a fundamental component necessary for the life and health of humans, animals other than humans, and indeed the planet itself—after all, '[t]here is no substitute for water' (Millay 2016)—it is perhaps inevitable that water would remain an area of intense ongoing and emerging concern for activists and others working to resist the various problems threatening human access to useable water, the state-corporate trade in water provision and control, and the sanctity and integrity of aquascapes fresh and salinated alike. Indeed, water has been referred to as an 'eco-social asset' (Beltrán and Velázquez 2015: 1026 (citing Aguilera 1995: 15))—something that possesses a 'social-cohesion dimension' in and for many communities (Beltrán and Velázquez 2015: 1026)—which is to say that water sustains both cultural and ecological life (see Arnold 2009: 833; Galway 2016). As such, in Chapter 7, *Too Important: Water and Resistance*, we explore, describe and discuss some

of these movements, with an eye on drawing links that reveal the fundamental interconnectedness of all resistance to the growing drivers of ‘the water problem’, a resistance that further underscores the boundary-transcending power of water as a unifying force and necessary element, and following that, water as a necessary site of criminological inquiry and attention.

Our concluding chapter reflects on each dimension of water crime, harm and security discussed in the preceding chapters, with an eye towards mapping the ways in which each dimension is currently linked and likely to become increasingly intertwined in the future. In so doing, this chapter serves to reassert the importance of developing criminological understandings of water. Indeed, as Arnold (2009: 843) asserts, ‘[w]ater is not just a good for human consumption. It is also a resource that can be or can become non-renewable due to the locations, methods, rate, and degree of its use’—and *abuse*. Criminology can play a role in helping to ensure fair and equitable access to clean and plentiful water necessary for human and ecological life.

Notes

1. Branch (2016: 50) added that ‘[f]or the last two decades, the promises examined most closely have to do with the environment’. According to Branch (2016: 50), Norway gained attention for staging a relatively environment-friendly Winter Olympics in 1994, which ‘suggested that rampant excesses of construction, with little regard for environmental impact, that had occurred [in previous Olympics] did not have to be the norm’. While the 2000 Summer Olympics, the 2010 Winter Olympics in Vancouver and the 2012 Summer Olympics in London were all ‘generally lauded for adhering to ambitious lists of sustainability goals’, Branch (2016: 50) points out that ‘[i]n trying to outbid one another and find support at home, cities increasingly throw in wish-list items that might have little chance of happening without the thrust of the Olympics—the cleanup of industrial sites (London), for example, or the construction of international airports (Athens) and the major expansion of public transportation (almost everyone)’. Branch (2016: 50) continues: ‘Chinese officials promised to improve Beijing’s persistent air pollution for the 2008

Summer Games, but today it remains an intractable problem. Part of the last Olympics, the 2014 Winter Games in Sochi—which reportedly cost more than \$50 billion—took place in a pristine mountain valley steam-rolled by construction. Environmentalists from around the world denounced everything from the dumping of waste to the blocked migration of wildlife’.

2. Note that other issues, such as Brazil’s political troubles and urban infrastructure, also received a share of the spotlight, as did concerns about the Zika virus, a collapsing economy, a political crisis and concerns about security (Branch 2016; Lefkoe and Cadwell 2016).
3. The discrepancy in range can be attributed, in part, to whether one is considering annual averages, which may hide the actual variability within a year. To understand water scarcity on a global level, some suggest the need to assess local ‘blue water scarcity’—the amount of fresh water that is withdrawn not returned on a monthly level (Hinckley 2016). This kind of assessment suggests that *four billion* people face water scarcity. Not all of these people face water scarcity all year around; rather, four billion people encounter water scarcity along the lines of one month a year (Hinckley 2016; see generally Taft 2016). About half-a-billion people actually experience water scarcity for the *entire* year (Hinckley 2016).
4. Todd Millay, managing director of Choate Investment Advisors in Boston, Massachusetts, offers similar figures and percentages: ‘As the world’s population continues to grow and becomes wealthier, demand for water is rising fast. . . . [B]y 2025, 1.8 billion people will be living in countries or regions with absolute water scarcity, and two-thirds of the world population could be under water stress. From human consumption to industrial and agricultural use, global demand for water and water services are expected to outpace current supply. . . . [T]here will be a 40% gap between water demand and supply over the next 15 years’.
5. Glaciers and ice caps are the primary source of fresh water on Earth. Groundwater is the world’s second-largest collection of fresh water—and accounts for 95 per cent of the planet’s fresh water that is *not* contained in polar glaciers and ice sheets (Mooney 2016); it is also the primary source of fresh water for approximately two billion people, and about 20 per cent of the world’s population depends on crops irrigated by groundwater (Barringer 2015). ‘Modern groundwater’—water that is less than 100 years old—is closer to the Earth’s surface (and less salty) than ‘old groundwater’ and, unlike ‘old groundwater’, has the capacity to renew itself through rainfall or melting snow. (Typically, groundwater salinity increases

with depth (Kang and Jackson 2016). The largest portion of drinking water is ‘modern groundwater’, but approximately 94.4 per cent of underground water has been there for more than 50 years (Schouten 2015.) Because ‘modern groundwater’ is close to the surface, it can help replenish large bodies of water when they are depleted throughout the year. But with climate change affecting the amount of rain and snow in certain regions, some groundwater reserves are not being refilled as fast as in the past. Human activities that cause pollution are also causing some groundwater in underground aquifers to become unusable, creating further challenges as the global demand for water increases (see Newbern 2015). Finally, it bears mention that there is a difference between the amount of water that may exist below the ground and the amount of water that can be extracted safely or sustainably (see Mooney 2016).

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2

Too Dirty: Water and Pollution

Most countries will impose restrictions on the discharge of pollutants into water and, in particular, will set standards for the quality of drinking water. Of course, whether these restrictions are applied with any rigour and whether these standards are met raise the kind of questions with which this book is concerned. We start here with the issue of pollution of water because it tends to be the most common water concern, crime or harm of which people are aware: often, although not always (as we will discuss below in the context of Flint, Michigan), polluted water *looks*, *tastes* or *smells* foul. Of course, for many people across the world, the greater issue is *access* to water in the face of drought—thirst and related starvation—and in such circumstances, polluted water is consumed on the basis that dirty water is better than no water at all. In other instances, water pollution leads to issues of water scarcity: a region may rely on a specific water body and when it becomes polluted, access to clean fresh water becomes frustrated (see generally Smith 2015). Our point is that while water pollution and access to clean water are often conceptualized as separate problems with different socio-economics and geopolitics, this is not always necessarily the case (McClanahan et al. 2015). We shall discuss these circumstances and the issues related to health and inequalities in a later chapter. For now, back to pollution—and to the different ways

in which it occurs—not always so easily detectable as might be assumed—as well as the different ways in which it is responded to, for purposes of prevention and prosecution of polluters.

Forms and Places of Pollution: Cases, Victims and Offenders

Humanity is, of course, the worst polluter on the planet. This has been so for as long as it has failed to manage the problem of sanitation. The natural make-up and chemistry of water will always, as Younger (2012: 35–36) puts it, provide ‘powerful clues’ about where it has come from but it is the ‘tell-tale signs of human interference’ such as the ‘presence of pathogens—that is to say, harmful microbes of faecal provenance’ that warn us about how safe or unsafe water is for consumption by humans or other mammals.

In Britain, in 1842, the report of the reformer Edwin Chadwick and the Poor Law Commission on the Sanitary Condition of the Labouring Population drew attention to the conditions of water pollution and ‘atmospheric impurities’ which ‘aggravated or propagated’ epidemics and ‘other disease’, particularly affecting the poor but also society more generally. Salzman (2012: 94) notes that Chadwick believed in the miasma idea of disease, in which particles of decayed matter lingered in the air, causing illness among those who had to breathe such air on a daily basis. The solution to the problem, said Chadwick, was water—to be used to wash away the waste causing the smell and bad air. The water would be directed through the sewers—an idea that today seems obvious and common sense but, as Salzman points out, had at this point been forgotten since the Romans: ‘This was a novel idea ... Prior to Chadwick’s time, sewers had been designed to drain rain from the streets; in fact the term “sewage” did not even exist until 1849’.

Major cities of the United Kingdom and the United States benefited from a new understanding of the need to improve urban sanitation. The idea of urban cleansing in this sanitary sense—making water available for drinking, bathing and washing, without spreading disease—was also

related to moral and crime-reduction goals. Chadwick's 1842 Report stated that: 'The formation of all habits of cleanliness is obstructed by defective supplies of water' and '[t]he population so exposed is less susceptible of moral influences' (quoted in Salzman 2012: 93); in the United States,

Noah Webster, author of the famed dictionary, urged his fellow Americans to recognize and improve the state of urban sanitation. Until this happened, he moralized, the poor 'will still wallow in filth, crowd their cities with low dirty houses and narrow streets; neglect the use of bathing and washing; and live like savages ...' (Salzman 2012: 95)

During the Industrial Revolution in the nineteenth century, metropolitan centres grew, with factories for labourers, workhouses for the destitute, storehouses for merchants and consumers, and mansions and banks for the wealthy and elite. The treadmill of production (Stretesky et al. 2014) that was set in motion generated both profit and pollution. Nonetheless, it is undoubtedly the case that huge advances were also made to improve sanitation and water supply in the major cities of industrialized Europe and North America during the nineteenth- and early twentieth-centuries. For example, nineteenth-century Chicago faced no shortage of water but had access to very little that was not seriously polluted. In response, major engineering projects created a new sewage system and tapped a water supply for the city from Lake Michigan. It is a project that followed from this, however, that ought to be remembered by those with responsibility for supplying clean water to populations. The construction of the Chicago Sanitary and Ship Canal in 1900 engineered the reversal of the flow of the malodorous and dangerous Chicago River, diverting it from flowing into the new water supply source, Lake Michigan, and directing it instead to the Mississippi River where, 300 miles downstream, the city of St. Louis now received Chicago's pollution. In Chicago, cases of typhoid decreased; in St. Louis, the opposite occurred (Salzman 2012: 95–96). This kind of diversion of water supply with dangerous if not criminal results has been a common feature of the history of water exploitation and cause of health problems and territorial disputes.

Swyngedouw (2005: 84) suggests that

Most international studies demonstrate that the organization of urban water supply systems can be broadly divided in four stages. The first stage continued up to the second half of the 19th century, when most urban water supply systems consisted of relatively small private companies providing parts of the city (usually the richer parts) with water of varying quality. Water provision was socially highly stratified, and water businesses were aimed at generating profits for the investors. (As Engels already contended, water pipes are laid where people can pay for the service; a process that is simultaneously excluding those deprived of the necessary means to access such privatized provision.)

During the late nineteenth- and early twentieth-century period of municipalization in the United Kingdom and other European nations, a regulatory tradition developed, related to the strength of municipal, socialist and public health movements. Expressions of municipal socialism were concerned with, as Swyngedouw (2005: 84) further explicates,

providing essential public goods at a basic, often highly subsidized, rate. Profitability was without any doubt a secondary concern and subsidies came from the general tax income (from either the local or the national state). This municipalization was also supported by local elites whose health and environmental conditions were equally negatively affected by deteriorating sanitary standards in the city.

These efforts of the ‘great and the good’ as well as the chroniclers of social issues of the day—the works of Charles Dickens are exemplary in this respect—noted the poor living standards and environmental conditions and called for a ‘sanitized city’ (Gandy 2004: 178–191; see also Smith and Phillips 2000). Even so, with numerous suppliers operating locally, and despite being beholden to the municipal public interest, standardization, regulation and inspection would have been difficult and piecemeal (Millward 1991). In the United States, there was less of a taste for regulation, and by the 1930s and the period of government interventions (termed the ‘New Deal’) that included federal subsidy of manufacturing, ‘the only people concerned with water pollution and enforcement were

conservationists. By the 1950s, water pollution was a low priority to Americans and state agencies acted accordingly' (Franz 2011: 34).

In the United Kingdom, before and after World War II, the water industry was highly fragmented. As Ofwat (2006) puts it:

Development of the industry had been largely in response to a growing population and increasing demand for water driven by the industrial revolution and accompanying economic growth. In 1945 there were more than 1,000 bodies involved in the supply of water and around 1,400 bodies responsible for sewerage and sewage disposal. Most of these were local authorities. Planning for water resources was a highly localised activity with little co-ordination at either a regional or national level.

This book is not particularly concerned with planning and coordination except where these have resulted in injustice, been distorted by corruption and have a bearing on the availability of oversight and accountability, and we will turn to discussion of various developments in regulation related to water pollution in a later part of the chapter. In Chapter 5, we will also describe the modern, late twentieth-century version of the fragmentation of water providers following privatization, which has occurred alongside the paradox of ever greater monopolization of water supply resulting from the concentration of ownership of these companies by transnational corporations. In passing, we might note that this has not been a development providing a beacon of good practice or—more to the point—'pollution free' activity. For example, in England and Wales, ten years after the privatization programme initiated by the Thatcher government in 1988, the Environment Agency noted that '[t]he companies included in our Hall of Shame have let down the public, the environment and their own industry' (Friends of the Earth 2001: 3).

In the rest of this section, having disposed of the matter of human pollution of water, as addressed by sanitation systems and water purification, we now provide examples of other forms and places of pollution. Inevitably, this can cover only a very limited range of case examples, and the victims and offenders involved. The aim, then, is to illustrate rather than provide an exhaustive review.

Dumping Toxic Waste, Polluting Water

When the Rana Plaza factory building in Bangladesh collapsed in 2013, it drew international attention to the crude exploitation of very low paid labourers who work to produce both mass market and high-value clothing for major supermarkets and fashion chains of the Global North. But less attention was paid to the environmental costs of this production formula, affecting local people and their daily health, food and water supply (Yardley 2013). Bangladesh is the second major exporter of such products after China, with industrial areas, such as Dhaka, supporting numerous garment factories, textile mills and dyeing plants. Operating with minimal restrictions in place, these workplaces dump toxic wastewater into canals and rivers that also reach rice fields and kill fish that provide local food. Kippenberg and Cohen (2013: 18) report that, '[i]n Bangladesh's capital Dhaka, around 150 tanneries expose local residents to untreated effluent that contains chromium, sulphur, ammonium, and other chemicals that cause skin diseases, rashes, and diarrhea, among other health problems'.

Thus, in Bangladesh, the local populations are victims of byproducts of a mainstay of the economy. In other contexts, toxic waste dumping into local waters has had the effect of radically *altering* the local economy, as in Somalia, where the impact of toxic waste dumping in coastal waters contaminated fishing grounds: 'Somalia's coastline has been used as a dumping ground for other countries' nuclear and hazardous wastes for many years as a result of the long civil war and, thus, the inability of the authorities to police shipments or handle the wastes' (UNEP 2005).

The tsunami of December 2004 'stirred up hazardous waste deposits', with the contaminants causing health and environmental problems for the fishing communities and the fish upon which they depended (UNEP 2005). In Collins' (2015) analysis of this situation, the socio-economic environment was transformed into one that was criminogenic. Traditional fishing had already suffered from competition with illegal fishing by vessels and trawlers from other countries. Toxic waste dumping made the sustainability of the fishing economy and communities even harder, contributing to what Collins (2015: 161) calls the 'multilayered motivations' for the turn to piracy by some of the Somalis.