



## Water Pollution and Environmental Injustices in Bangladesh

**Sarker Faroque and Nigel South**  
University of Essex, United Kingdom

### Abstract

Water is an essential element for human life but is being wasted and made unsafe due to anthropogenic activities and pollution. In Bangladesh, both surface water and groundwater are being polluted due to the rapid growth of urbanisation and industrialisation, and most importantly, arsenic contamination and industrial waste are affecting the potability of this natural resource. Bangladesh is a highly polluted country that faces a scarcity of clean water, despite having an abundance of water sources. This article presents a range of examples of existing environmental pollution in Bangladesh before focusing on water pollution and its causes and consequences. In addition, this article discusses how inefficient water management and poor law enforcement have failed to ensure environmental justice for the citizens of Bangladesh. Finally, this article concludes with observations about some ways forward to ensure water justice, enable access to clean water for all and achieve sustainable development in Bangladesh.

### Keywords

Arsenic contamination; environmental justice; environmental pollution; water management; water pollution.

*Please cite this article as:*

Faroque S and South N (2021) Water pollution and environmental injustices in Bangladesh. *International Journal for Crime, Justice and Social Democracy*. Advance online publication.

<https://doi.org/10.5204/ijcjsd.2006>

Except where otherwise noted, content in this journal is licensed under a [Creative Commons Attribution 4.0 International Licence](#). As an open access journal, articles are free to use with proper attribution.  
ISSN: 2202-8005



*Water, water, everywhere,  
Nor any drop to drink.  
(ST Coleridge 1798)*

## Introduction

A couple of lines from the poem *The Rime of the Ancient Mariner* by Samuel Taylor Coleridge remind us of the tragedy and torment of being in need of potable water yet having access only to water that is undrinkable or polluted. The old mariner is cursed for killing an albatross and condemned to drifting and to thirst, surrounded by salty seawater that he cannot drink. As Parker (2020) explained:

The murdered albatross is a bottomless symbol: It stands for everything you greedily grabbed at, everything you squandered or spurned, every ornament of the ego, every plastic water bottle, every corrosive pleasure, every idle meanness, every dead and bleached-out lump of coral on the Great Barrier Reef. Killing it, the mariner severs himself from the source of his being; the bird's body is hung around his neck like a millstone.

The poem, stated Parker (2020), taking a view from two centuries later, carries a forewarning of ecological catastrophe and our drift into a 'liminal state: the treacherous zone between a ruined world and a new one'. As Earle (2009: 3) observed, the ruination of the Earth and '“Green” issues make headlines these days', but as the mariner's curse illustrates and Earle emphasised:

many seem unaware that without the 'blue', there could be no green, no life on Earth and therefore none of the other things that human's value. Water—the blue—is the key to life. With it, anything is possible; without it, life does not exist.

This article takes the case of Bangladesh as an illustration of the environmental problems and challenges facing some countries of the Asian Global South, beginning with an overview of sources and sites of pollution in the country and then focusing on perhaps the most fundamental environmental challenge facing the country—the causes and consequences of water pollution.

The structure of this paper is as follows. It first notes some recent criminological examinations of water issues. The following sections describe the environmental problems and challenges that Bangladesh faces and provides examples of air, water and noise pollution, waste dumping, and deforestation. Then, the paper considers some cases, causes and consequences of water pollution. A concluding discussion offers observations about water management, environmental injustice and the future effects of climate change in Bangladesh.

## Water, Pollution and Cultural Bias in Criminological Studies

The human body is 70% water; more than half the world's flora and fauna live in water; and the food consumed by land species depends on and is often mainly constituted of water (Smol 2002). According to Vigil (2003: 2):

the quality of the Earth's water is vital to our existence. We need ample clean water to quench our thirst, irrigate our fields, and sustain all life forms in the environment. We must have clean water in our homes, communities, businesses, industries, and in nature. We need clean water today, and we will need it tomorrow.

Yet, the 'blue' planet, apparently amply supplied with water, faces several immediate and impending water crises related to overuse and overconsumption, poor resource management, climate change and pollution (Brisman et al. 2018; García Ruiz et al. 2020; Leahy 2018). Global water demand is expected to rise by 55% between 2000 and 2050, and in terms of its value as a global resource, water has been described as 'the

next oil' (Lufkin 2017), with one hedge fund analyst suggesting that in the future, water access will provide 'serious profit opportunities for those in the know ... If you play it right ... the results of this impending water crisis can be very good' (Johnson et al. 2016: 149; see also Nelson 2012).

Historically, water has enabled trade, commerce, innovation and progress (Lufkin 2017), but these economic developments have had environmental effects and consequences. This has been particularly evident in countries of the Global South that have suffered a growth in environmental problems (Goyes et al. 2017). These problems have been the result of a combination of past colonial—and contemporary corporate—exploitation, failures of governance and regulation, and levels of poverty and education, all of which need to be addressed, meaning that industrial activity and growth have been prioritised over environmental conditions and sustainable development plans have been compromised (Machingura and Lally 2017; United Nations 2020).

Recent studies in critical criminology have recognised the importance of water as well as current and impending challenges, such as the global freshwater scarcity due to pollution (McClanahan et al. 2015) and climate change (Agnew 2012). Access to water and its equitable distribution have been altered by increased privatisation, with consequences including the erosion of the meaningful delivery of the right to safe water and adequate sanitation, as expressed in international conventions (Brisman, McClanahan and South 2016; Brisman et al. 2020). According to Eman et al. (2017), various forms of water crime are of significance for criminology, including:

pilfering of water from pipelines, illegal waste management, water theft, river and marine pollution, manipulation of sampling methods to avoid treatment costs, fraud and illegal trafficking of water, terrorism and cyber-attacks on water management operations, illegal waste discharges from factories, and unauthorised consumption from the water network (108; see also Baird et al. 2021; Brisman and South 2016).

Brisman et al. (2018, 2020) have provided international case studies.

Critical criminology has been enriched by new directions, such as southern criminology and green criminology (Goyes 2019), that, at least partially, rectify the cultural biases and geographic limits of past studies and preoccupations, but there remains much to be done to engage with the excluded experiences of many people and places across the planet. This article responds to the call for international criminology to reflect upon and address cultural bias (Goyes and South 2017; van Swaaningen 2021)—in this case, by gathering and presenting data from Bangladesh, a secular state with a majority Muslim population, an emerging economy and a position in South Asia that has a legacy of colonialism.

### **Environmental Problems in Bangladesh**

In a photographic essay, photojournalist Allison Joyce (2015) presented images of the Buriganga River, described as having once been 'the lifeline of Dhaka'—the capital city—but that is 'now one of the most polluted rivers in Bangladesh'. The piece includes an image of children playing 'outside their home next to a polluted canal' and notes that 'residents of the neighbourhood slums are exposed to extreme pollution in the air, water and soil'. The photo-essay can convey more starkly than can words the effects that pollution—such as the daily dumping of over 20,000 cubic litres of toxic waste from leather tanneries—has on a river that still serves as a water supply.

Bangladesh is a South Asian nation with a population of over 180 million people within 144,000 square kilometres. In recent decades, it has experienced rapid industrialisation, enormous urbanisation and massive digitalisation, with serious environmental consequences resulting from the associated increases in consumption and waste and the use of energy and resources (Faroque and South 2020; Rahman 2015). As outlined below, all forms of pollution are common—air, water, soil and sound. Waste dumping includes domestic, industrial, medical and electronic refuse, while deforestation has occurred across the country.

Processes of urbanisation and industrialisation have affected several waterbodies and rivers to the extent that they are now disappearing.

## **Air, Water, Earth and Fire: Sources and Sites of Pollution**

### ***Air Pollution***

The economic, industrial and population growth of Dhaka mean that air pollution is now an acute problem in the city (Rahman, Mahamud and Thurston 2019). Major sources include vehicular assembly and emissions (Murphy and King 2014: 123); by-products of textile and garment manufacturing; tanneries; food, sugar and pharmaceutical processing; and, notably, the proliferation of brickmaking enterprises that burn coal and wood to fire kilns, resulting in the emission of particulate matter, sulfur oxides and volatile organic compounds (Islam 2014; Mahmood 2011).

### ***Noise Pollution***

Atmospheric pollution is not only limited to physical particulate matter but also includes the transmission of sound and noise in the city (Brisman et al. 2021; García Ruiz and South 2018). Numerous megaprojects across Bangladesh involve transportation and construction works, which increases noise pollution (Akhand et al. 2012; Sultana et al. 2020). Dhaka city is particularly exposed (Chowdhury et al. 2010), but almost every town and city in Bangladesh suffers severe sound pollution (Dey 2002) as a result of traffic congestion (e.g., the frequent use of sirens and horns), construction sites, music and public announcement sound systems, places of prayer and public meetings (Keegan 2018; Mansoor 2020). Buckley (2013) reported that noise has become harder than ever to avoid, and silence has become a luxury that only a scant few can truly afford.

### ***Deforestation***

Deforestation is significant in Bangladesh, with forest resources being exploited for various projects related to growth, which causes associated adverse stress for biodiverse ecosystems. The country has had one of the highest rates of deforestation in South Asia, with a loss of 2,600 hectares (26 square kilometers) per year (Reza and Hasan 2019), and according to Global Forest Watch (2020), in 2019, the country lost 22.1 kilohectares of natural forest. Deforestation occurs for several anthropogenic reasons, including industrialisation, profit motives, development projects, forest management policies, to clean up after natural disasters, to address salinity and sedimentation in certain areas and to address poverty; criminal enterprises also extract resources from forests and engage in illegal logging (Mahbub and Ahmed 2008). The phenomenon of 'land-grabbing'—simply taking or occupying owned or protected lands—has become increasingly common. For example, corporate and industrial bodies, as well as the rich and influential, have claimed more than one-fifth of reserved woodland in Gazipur District (Daily Sun 2019), while the less powerful have also 'grabbed' forestland to build houses, schools, marketplaces and other facilities (Akhand 2019).

### ***Electronic Waste***

Electronic and electrical waste (e-waste) is a serious threat to the natural environment and human health and is another consequence of industrialisation, urbanisation and digitalisation. Significantly, 2021 marks the end of the Digital Bangladesh Vision 2021 strategy, which aimed to bring about 'socioeconomic transformation through ICT [information and communication technology]' and has 'so far made good progress' (Lucini and Stryjak 2017: 10). E-waste management has become a challenge for Bangladesh, with around 40 million mobile phones being imported every year and a cycle of purchasing and discarding creating a growing amount of e-waste, with only 3% of the total generated e-waste being collected or recycled (South 2015; Daily Star 2019a). The remaining 97% is disposed of in landfills, rivers, drains, lakes, canals and open spaces (Ahmed 2020).

### ***Waste Dumping***

Dhaka still lacks efficient waste management systems, even after numerous initiatives were undertaken in collaboration with international donor agencies (Mahmud 2018). In 2011, the Dhaka North City Corporation and the Dhaka South City Corporation authorities were formed and promised to turn the city into a clean, green, liveable, digital and smart metropolis (Mahmud 2018). However, the Global Liveability Index of 2019 still placed Dhaka as the third least-liveable city in the world, following Lagos and the war-torn Syrian capital, Damascus (Ahmed 2019; Dhaka Tribune 2019).

In addition to familiar sources of domestic and industrial waste, Bangladesh is heavily involved in the ship-breaking industry, which generates various types of dangerous metal waste as the steel of scrapped ships is coated with paint that contains toxic substances, such as lead, cadmium, chromium, zinc and arsenic (Holy 2020). Growing and indiscriminate healthcare waste dumping in Bangladesh has not been addressed properly, yet it has been identified as one of the major health and environmental issues in the country (Biswas et al. 2011). To meet the needs of Bangladesh's large population, both legal and illegal healthcare facilities have flourished, producing a huge amount of healthcare waste, which is poorly managed (Rahman et al. 2020). The processes of storing, collecting and disposing of healthcare waste are unsafe and do not follow science-based protocols—both hazardous and non-hazardous waste are thrown together in municipal waste bins and may then be dumped in relatively open spaces (Islam 2017; Islam et al. 2019).

This long-recognised problem was addressed in 2008 with the introduction of medical waste management rules, but these have never yielded significant results, and the current Covid-19 pandemic has simply deepened the healthcare waste management problem surrounding the safe disposal of materials such as masks, gloves and other personal protective equipment. If the past practice continues, then the poor may collect such waste and try to sell it to recycling enterprises (Emdadul et al. 2012; Daily Star, 2020). News reports have suggested that criminal operations are making money by selling items of protective clothing and equipment that have been used in hospitals (Business Standard 2020; Rabbi 2020).

All of the above examples of pollution may seem distinguishable, although, of course, it is also important to recognise how they combine and compound their damaging effects. Ultimately, however, all of these sources and forms of pollution are, in one way or another, dependent upon water to enable socio-economic activity.

### **Water Pollution: Surface and Groundwater Pollution**

Bangladesh has vast water resources, but both surface water and groundwater are being contaminated constantly by heavy metals, bacteria and pesticides (Hasan et al. 2019). Water can act as a universal solvent, making it particularly easy to pollute, as the toxic properties of different sources dissolve into it (Denchak 2018). Various forms of waste are disposed of and not only dissolve into ponds, lakes, streams, rivers and coastal seas but also leach into land areas that are used as dump sites or for mining or manufacturing that involves chemicals—a process that is exacerbated by heavy rainfall. Pollution of both surface and groundwater sources follows.

#### ***Surface Water Pollution***

According to the annual report of the National River Conservation Commission (2019), Bangladesh—once widely known as the 'land of rivers'—has had a historical count of 700 rivers, which has been reduced to barely 405 today. Dhaka is encircled by the Buriganga, Turag, Balu and Shitalkshya rivers, but these 'lifelines' have now almost died, are highly contaminated as a result of waste dumping and represent serious health hazards and threats to the wider environment. As the China Daily (2020) has reported, since the turn of the new century, industrial waste dumping has turned the Bangshi River into a stream of chemical waste; several factories from the Dhaka Export Processing Zone (DEPZ) and other factories, particularly the textile factories in Ashulia, have been releasing contaminated liquid waste into a waterbody near the DEPZ. As Allison Joyce's (2015) photos showed, the networks and knots of rivers and canals and the water-side homes and factories across the water map of Dhaka mean that being far removed

from the presence and effects of pollution is close to impossible. However, it is not only direct contamination that has resulted in the death of these lifelines but also the combined effects of urbanisation and industrialisation. The rivers in Bangladesh are dying and have lost their navigability, as cities have grown based on a lack of regard for the effect of human activities on the environment (Goudie and Viles 1997). As Rokon (2020) highlighted, the construction of unplanned infrastructure—such as roads, highways, bridges and unsystematic real estate development—has affected the health of rivers, and even barrages, dams, embankments and polders that have been established for official or unofficial ‘river management’ have contributed to the declining health of rivers.

Because water is easily accessible for production and easy waste disposal, textile workshops and tanneries have been established on the banks of rivers, and on a daily basis flush both organic and inorganic contaminants—such as dye, acid, alkali, heavy metals and other chemical waste—into the river (Sarkar et al. 2016).

### ***Groundwater Pollution and the Arsenic Phenomenon***

In Bangladesh, the monsoon period brings heavy rains that pour into the earth, filling cracks and crevices. Underground spaces fill, creating a water store or aquifer that can be a source of groundwater—an invisible but important natural resource (Brisman et al. 2018: 154; Denchak 2018). Tubes are sunk into deep wells, and groundwater is pumped up from beneath the surface; most of the population, particularly in rural areas, rely on these groundwater sources for drinking, bathing and domestic purposes (Human Rights Watch, 2016).

Causes of groundwater contamination are complex due to human alteration of the landscape (Massachusetts Institute of Technology [MIT] 2009) and the wider social organisation of production practices in society (Jackson 1992). However, groundwater contamination basically results from contaminants—for example, pesticides and fertilisers—making their way into an aquifer. Once groundwater is polluted, it is extremely difficult and costly to make it safe again, and it may be unusable for decades or even hundreds of years (Denchak 2018). However, among the varied sources of contamination, perhaps the most severe and alarming is related to the presence of arsenic. As Mandal and Suzuki (2002: 201–202) have noted, arsenic is a ‘ubiquitous element that ranks 20th in abundance in the earth’s crust’ and appears in ‘over 200 different mineral forms’. Arsenic is a heavy metal contaminant that is likely recognisable by most people through its use as ‘the king of poisons’ in fictional detective stories (Harkup 2016: 19), but it is genuinely lethal, eliciting ‘an appalling reaction for its mutagenic, carcinogenic, and teratogenic effects’ (Chatterjee et al. 2017: 1).

Arsenic contamination in groundwater can occur at any time from various sources—for example, as a result of being used in agricultural products or manufacturing processes (Ahuja 2008)—but it also exists in the underground sediment of the Ganges Delta, which may explain its presence in some groundwater (MIT 2009). Henke (2009: 149) has detailed the variety of other possible sources:

- (1) the improper manufacturing, use, and disposal of products containing arsenic; (2) extensive applications of arsenic-bearing pesticides and phosphate fertilizers; (3) mine drainage and smelter emissions; (4) the percolation into the subsurface of evaporative brines or runoff from weathering outcrops and irrigation; (5) oxidation of sulfide minerals in expanding unsaturated zones resulting from declining water tables; (6) geothermal waters and discharges from power plants; (7) reductive dissolution of arsenic-bearing iron and manganese (oxy)(hydr)oxides, and (8) bacterial degradation of natural or artificial organic materials, production of carbonate species, and subsequent desorption of arsenic from mineral surfaces.

Arsenic pollution in Bangladesh was discovered in the 1980s, although the scale of contamination in rural water supplies was only really understood from around the mid-1990s (Human Rights Watch 2016). Thereafter, between 1999 and 2006, efforts were made by both governmental and non-governmental

organisations—and international funding provided further support—to attenuate the amount of arsenic contamination in Bangladesh’s groundwater. Field testing of around five million tube wells produced data for health officials, the government and the owners of the wells (Human Rights Watch 2016). Chapai Nawabganj District was the first location in Bangladesh in which arsenic was detected in tube well water, and according to Huq (2008: 25), ‘the most severely contaminated districts lie in the north-central, southeastern, and southwestern regions of the country, where up to 90% of the wells tested are contaminated. In general, the southern half of the country is more contaminated than the northern half’.

Ahuja (2008), reporting on contamination, calculated that if the total number of tube wells at that time was 8.6 million, it could be assumed that more than two million wells were likely to be contaminated and as many as 100 million people exposed to high levels of arsenic, as measured by the World Health Organization’s standards. More recently, Human Rights Watch (2016) cited a figure of 10 million wells, and Hasan et al. (2019) suggested that arsenic is the cause of death in around 43,000 cases annually. Regular ingestion of small doses of arsenic has been linked to bladder, kidney, lung and skin cancers, and significant exposure can result in seizures and cardiovascular problems or coma (Hasan et al. 2019).

The irony and tragedy of the arsenic problem is that so many of the tube wells were installed in rural areas over recent decades as part of a successful campaign to provide pathogen-free drinking water (Hassan 2018), but it was not realised that the shallow groundwater that the wells tapped into might carry another danger. A Human Rights Watch (2016) report highlighted that this danger largely affects the rural poor:

Arsenic does not affect the drinking water of Bangladesh’s capital Dhaka or other large cities, where drinking water comes from deep aquifers of higher-quality water, or from treated surface water, which is then distributed through a network of pipes. Rather, it affects hand-pumped, mostly shallow, tube wells across huge swaths of rural Bangladesh.

## **Water Management**

Rokon (2020) has criticised the Bangladesh water management system, noting that there are at least 18 different agencies engaged in river management, yet there is no single government institution or set of legal tools in Bangladesh to ensure the good health of the rivers. Laws requiring factories to install effluent treatment plants (ETPs) do exist, but factories do not comply with them, and the laws are under-enforced and may face obstacles, as ETP units are not readily available locally, and import taxes discourage their purchase (Sakamoto et al. 2019). Overall, ineffective laws and policing, accusations of corruption, and cases of improper influence stifle efforts to improve water management (Ahmed 2020). In 2019, the chair of the National River Conservation Commission (NRCC) observed that ‘influential people like politicians, businessmen and musclemen have mostly occupied the river land in collaboration with government officials’ (Kamol 2019: 2), and the NRCC has recently identified 49,558 ‘river grabbers’ in 64 districts (Financial Express 2020), including Padma, Meghna, Jamuna, Brahmaputra, Surma, Pashur and Karnaphuli (Kamol 2019). These figures are, however, likely to be underestimates, and official responses are limited. As the Financial Express (2020: 5) reports:

With the river grabbing continuing unabated across the country, lists of the persons and syndicates behind the abominable act are often prepared, though follow-up action [has] been lacking. The task is reportedly beset with [a] lack of coordination. The problem is that mere listing out of the people active behind grabbing rivers cannot stop the act. Apart from being faulty, the list-preparations may, in several cases, be biased too.

Measures against river encroachers are not entirely lacking, however, and provisions do exist to prevent offenders from standing in elections or receiving bank loans, while the media has been encouraged to publish names of offenders to expose them to the public (Daily Star 2019 c). In addition, law enforcement agencies have acted against around 905 illegal facilities—including mills, factories, shops, restaurants and multi-storey buildings—and overseen the demolition of 445 of these to prevent further pollution and river grabbing (Daily Star 2019 c).

As noted above, there has been some national and international response to the problem of arsenic contamination, but according to Human Rights Watch (2016), this has been inadequate, and its report on the problem and the challenges offered a number of conclusions and recommendations to the government. Human Rights Watch found that the:

official response to arsenic contamination of drinking water in Bangladesh's rural villages is failing, with the government instead expending considerable resources in areas where the risk of arsenic contamination is relatively low and where water coverage is relatively good. Despite government reports stating that the government should do a better job of targeting arsenic mitigation options in areas where they are most needed, it inexplicably fails to do so.

New water installations with the capability to mitigate arsenic contamination are recognised as a way forward, but the report suggests that corruption is undermining the 'allocation of new government water points by diverting these life-saving public goods to ... political supporters' and cites 'at least one' recent government source acknowledging the 'influence of parliamentarians' regarding the location of 50% of all new water points (Human Rights Watch 2016).

### **Conclusion: Water Pollution and Environmental Injustice**

According to the United Nations Committee on Economic, Social and Cultural Rights (2002: 2), the human right to safe drinking water and sanitation is defined as the 'right of everyone to sufficient, safe, acceptable and physically accessible and affordable water for personal and domestic uses'. As Human Rights Watch (2016) has argued:

Bangladesh has led international advocacy to recognize water as a human right at the United Nations. But at the national level, realizing this right to water requires reviving the commitment that the government and international donors displayed up until 2006.

This is partly about a commitment to the delivery of policies that *do* exist. In an otherwise favourable assessment of environmental policy and legislation in Bangladesh that was prepared for the United Kingdom's Department for International Development, Clemett (2006: 9) has expressed concerns about 'the institutional capacity and capability' to enforce law and policy, observing that there seemed to be:

few action programmes and a lack of skills and expertise to take appropriate actions to ensure that both government and private sector developments properly address environmental concerns. With few exceptions there is still a lack of institutional awareness let alone capabilities to address policy goals and objectives.

The conclusions that have been drawn by Sakamoto et al. (2019: 10) support this analysis and describe government responses to the challenge of encouraging effluent treatment as 'myopic', given its actions—a high import tax on equipment, limited monitoring and enforcement, and no support or subsidy—all of which simply discourage voluntary installation. Sakamoto et al.'s further example of failings and unintended consequences arising from efforts to reform the tannery sector is instructive, as detailed below.

In July 2001, a High Court judgment required tanneries in Hazaribagh to control their pollution. In response, a government plan was prepared for the development of a new industrial tannery complex to be opened by December 2005. In subsequent years, 'the High Court repeatedly ordered tanneries to move and the government to take relevant countermeasures to solve the problem, but the process was so slow that the deadline was extended repeatedly' (Sakamoto et al. 2019: 10). Design approval was only given in April 2013, and relocation only began in 2017. However, once relocated and before completing the effluent treatment works, the factories restarted operations and began 'releasing chemicals into the Daleshwari River and dumping toxic waste in open fields. As of February 2019, construction still had not been completed' (Sakamoto et al. 2019: 10).

In April 2019, prime minister Hasina asked the public to cease the practice of discharging wastes into rivers and stated that ‘every industrial unit will have to have a waste management system so that it doesn’t pollute rivers. Unfortunately, not much has changed’ (Ranjan 2019; para. 7). In the same year, the Supreme Court issued a landmark judgment that incorporated 17 directives aimed at saving the nation’s rivers and waterbodies from grabbing and pollution and declared that the Turag River should be attributed the status of a ‘person’—a legal entity entitled to justice (Ranjan, 2019). This development follows not only a growing acceptance of the proposition that ‘natural objects’ can be given rights as legal personalities (Stone 1972) but also the awarding of a similar status to a natural park and river in New Zealand in 2014 and 2017, respectively, to the Ganges and Yamuna rivers in India in 2017 and to the Atrato river in Colombia in 2016 (Fischer-Lescano, 2020) As Berry (1999: 161) argued in relation to such developments in ‘earth jurisprudence’, law and society need to be able to ‘provide for the legal rights of geological and biological as well as human components of the earth community’ (see also South 2017: 26–27).

Despite this impressive step, the water future for Bangladesh is not looking bright and clear. According to the studies that were summarised by Molla (2018), while sewage management is poor across South Asia, which causes the pollution of rivers across the region, Bangladesh, in particular, suffers, as it is a downstream recipient; also, heavy dependence on groundwater could lead to future land subsidence, which, alongside climate change, could contribute to a rise in local sea levels, introducing salinity into water systems. Action across South Asia, global innovation and investment in water technologies, and a commitment to ensuring water rights and environmental justice are required for Bangladesh to respond to and mitigate existing water problems and new challenges.

*Correspondence:* Nigel South, Professor of Sociology, Department of Sociology, University of Essex, Colchester, Essex, CO4 3SQ, United Kingdom. Email: [n.south@essex.ac.uk](mailto:n.south@essex.ac.uk)

## References

- Agnew R (2012) Dire forecast: A theoretical model of the impact of climate change on crime. *Theoretical Criminology* 16(1): 21–42. <https://doi.org/10.1177%2F1362480611416843>
- Ahmed R (2019) Dhaka world’s 3rd worst liveable city. *New Age*, 5 September. <https://www.newagebd.net/article/83611/dhaka-worlds-3rd-worst-liveable-city>
- Ahmed R (2020) Swelling e-waste threatens health, environment in Bangladesh. *New Age*, 30 January. <https://www.newagebd.net/article/98178/swelling-e-waste-threatens-health-environment-in-bangladesh>
- Ahuja S (2008) The problem of arsenic contamination of ground water. In Ahuja S (ed.) *Arsenic contamination of ground water: Mechanism, analysis and remediation*: 1–21. USA: Wiley.
- Akhand MR, Ali MS, Haq MA, Islam MM and Haque MF (2012) Status of noise pollution in mixed areas of Dhaka city: A GIS approach. *Journal of Environmental Science and Natural Resources* 5(1): 9–17. <https://doi.org/10.3329/jesnr.v5i1.11548>
- Baird A, Walters R and White R (2021) Water theft maleficence in Australia. *International Journal for Crime, Justice and Social Democracy* 10(1): 83–97. <https://doi.org/10.5204/ijcjsd.v10i1.1604>
- Berry T (1999) *The great work: Our way into the future*. New York: Bell Tower.
- Biswas A, Amanullah ASM and Santra SC (2011) Medical waste management in the tertiary hospitals of Bangladesh: An empirical enquiry. *ASA University Review* 5(2): 149–158.
- Brisman A, García Ruiz A, McClanahan B and South N (2021) Exploring sound and noise in the urban environment: Tensions between cultural expression and municipal control, health and inequality, police power and resistance. In Persak N and Di Ronco A (eds) *Harm and disorder in urban space: Social control, sense and sensibility*. Abingdon: Routledge. <https://doi.org/10.4324/9781003092643>
- Brisman A, McClanahan B and South N (2016) Water security, crime and conflict. In Tonry M (ed.) *Oxford handbooks in criminology and criminal justice*. New York: Oxford University Press.

- Brisman A, McClanahan B, South N and Walters R (2018) *Water, crime and security in the twenty-first century: Too dirty, too little, too much*. London: Palgrave.
- Brisman A, McClanahan B, South N and Walters R (2020) The politics of water rights: Scarcity, sovereignty and security. In Eman K, Mesko G, Segato L and Migliorini M (eds) *Water, governance and crime*: 17–29. New York: Springer.
- Brisman A and South N (2016) Water, inequalities and injustice: Social divisions, racism and colonialism—Past and present. In Meško G and Lobnikar B (eds) *Criminal justice systems in Central and Eastern Europe—Safety, security and social control in local communities*: 359–366. Ljubljana: University of Maribor.
- Buckley, C (2013) What? Outdoor Roar. Behind City's Painful Din, Culprits High and Low. *New York Times*, 12 July, <https://www.nytimes.com/2013/07/12/nyregion/behind-citys-painful-din-culprits-high-and-low.html>
- Business Standard (2020) Gang busted for selling used masks, gloves. 25 April. <https://tbsnews.net/bangladesh/gang-busted-selling-used-masks-gloves-73555>
- Chatterjee S, Dharmendra K, Gupta DK, Razafindrabe BHN and Tiwari S (2017) Arsenic Contamination from Historical Aspects to the Present, In: Chatterjee, S and Gupta, D K (eds) *Arsenic Contamination in the Environment. The Issues and Solutions*, 1-12, Switzerland: Springer
- Chowdhury SC, Razzaque M, Helali MM and Bodén H (2010) Assessment of noise pollution in Dhaka city. In *17th international congress on sound and vibration (ICSV17)*, Cairo, Egypt, 18–22 July 2010. <http://kth.diva-portal.org/smash/get/diva2:479977/FULLTEXT01.pdf>
- Clemett A (2006) *A review of environmental policy and legislation in Bangladesh*. Department for International Development. <https://www.gov.uk/research-for-development-outputs/a-review-of-environmental-policy-and-legislation-in-bangladesh>
- Coleridge ST (1798) The rime of the ancient mariner. In Wordsworth W and Coleridge ST (eds) *Lyrical ballads, with a few other poems*. Bristol, UK: Biggs and Cottle.
- Daily Star (2019a) Eye on e-waste: Experts term it a billion-dollar industry. 3 February. <https://www.thedailystar.net/business/telecom/e-waste-management-in-bangladesh-move-to-exchange-old-mobile-sets-cash-the-cards-1696426>
- Daily Star (2019c) No polls, no loans for river grabbers. 3 February. <https://www.thedailystar.net/environment/no-river-land-grabbers-can-contest-election-1696807>
- Daily Star (2020) 1 held for sale of used masks, gloves in Tongi. 19 March. <https://www.thedailystar.net/country/news/1-held-sale-used-masks-gloves-tongi-1882831>
- Daily Star/ANN (2020) Bangladesh: Once a lifeline, polluted Bangshi River now dying. *China Daily*, 16 February. <https://www.chinadailyasia.com/article/121305>
- Daily Sun (2019) Grabbers devour one-fifth of Gazipur forest land. 25 March. <https://www.daily-sun.com/arcprint/details/380180/Grabbers-devour-onefifth-of-Gazipur-forest-land-/2019-03-25>
- Dhaka Tribune (2019) Global live ability index 2019: Dhaka named 3rd worst city to live. 4 September. <https://www.dhakatribune.com/bangladesh/2019/09/04/global-liveability-index-2019-dhaka-named-3rd-worst-city-to-live>
- Denchak M (2018) *Water pollution: Everything you need to know*. <https://www.nrdc.org/stories/water-pollution-everything-you-need-know#whatis>
- Dey AR (2002) Noise pollution in Dhaka: Current situation and suggestion for action. *Work for a Better Bangladesh (WBB)*. <https://ben-global.net/wp-content/uploads/2016/08/Noise-Pollution-In-Dhaka-Current-Situation-And-Suggestions-For-Action-2002.pdf>
- Earle SA (2009) *The world is blue: How our fate and the oceans are one*. Washington, DC: Little Brown.
- Eman K, Kuhar S and Meško G (2017) Water crimes and policing. *Journal of Criminal Justice and Security* 19(2): 105–119.
- Emdadul HS, Mutahara M and Rahman M (2012) Medical waste management (MWM) in Dhaka, Bangladesh: It's a review. *Home Health Care Management & Practice* 24(3): 140–145. <https://doi.org/10.1177%2F1084822311425235>
- Faroque S and South N (2020) Challenges, responses and collaborations concerning environmental crimes and harms in Bangladesh. *International Journal of Comparative Criminology and Offender Therapy*. <https://doi.org/10.1177%2F0306624X20969938>
- Financial Express (2020) In pursuit of river grabbers. 3 February. [https://epaper.thefinancialexpress.com.bd/?archiev=yes&arch\\_date=03-02-2020#](https://epaper.thefinancialexpress.com.bd/?archiev=yes&arch_date=03-02-2020#)
- Fischer-Lescano, A (2020) Nature as a Legal Person: Proxy Constellations in Law, *Law & Literature*, 32:2, 237-262.
- García Ruiz A and South N (2018) Surrounded by sound: Noise, rights and environments. *Crime, Media, Culture* 15(1): 125–141. <https://doi.org/10.1177%2F1741659017751223>
- García Ruiz A, South N and Brisman A (2020) Eco-crimes and ecocide at sea: Toward a blue criminology. *International Journal of Comparative Criminology and Offender Therapy*. <https://doi.org/10.1177/0306624X20967950>

- Global Forest Watch (2020) *Bangladesh deforestation rates & statistics*.  
<https://www.globalforestwatch.org/dashboards/country/BGD/?category=summary&location=>
- Goudie A and Viles H (1997) *The earth transformed: An introduction to human impacts on the environment*. Oxford: Blackwell.
- Goyes D (2019) *Southern green criminology*. Bingley: Emerald.
- Goyes D and South N (2017) Green criminology before 'green criminology': Amnesia and absences. *Critical Criminology* 25(2): 165–181. <https://doi.org/10.1007/s10612-017-9357-8>
- Goyes DR, Mol H, Brisman A and South N (eds) (2017) *Environmental Crime in Latin America: The theft of nature and the poisoning of the land*, London: Palgrave
- Harkup K (2016) *A is for arsenic: The poisons of Agatha Christie*. London: Bloomsbury.
- Hasan MK, Shahriar A and Jim KU (2019) Water pollution in Bangladesh and its impact on public health. *Heliyon*, 5(8): 1–23. <https://doi.org/10.1016/j.heliyon.2019.e02145>
- Hassan MM (2018) *Arsenic in groundwater poisoning and risk assessment*. New York, USA: Taylor & Francis Group.
- Henke K (2009) Arsenic in natural environments. In Henke K (ed.) *Arsenic: Environmental chemistry, health threats and waste treatment*: 69–235. UK: Wiley.
- Holy IJ (2020) E-Waste management: Time for a reboot. *LightCastle*, 2 April.  
<https://www.lightcastlebd.com/insights/2020/04/02/e-waste-management-time-for-a-reboot>
- Human Rights Watch (2016) *Nepotism and neglect: The failing response to arsenic in the drinking water of Bangladesh's rural poor*. New York: Human Rights Watch. <https://www.hrw.org/report/2016/04/06/nepotism-and-neglect/failing-response-arsenic-drinking-water-bangladeshs-rural>
- Huq SMI (2008) Fate of arsenic in irrigation water and its potential impact on the food chain. In Ahuja S (ed.) *Arsenic contamination of groundwater: Mechanism, analysis, and remediation*: 23–49. New Jersey, USA: John Wiley & Sons.
- Islam MK (2017) Present status of medical waste disposal System in Chittagong Medical College Hospital (CMCH), *IOSR Journal of Environmental Science, Toxicology and Food Technology* 11(2): 107–112.
- Islam MS (2014) Air pollution in Dhaka city: A burning issue. *Journal of Science Foundation* 12(2): 20–21.  
<http://dx.doi.org/10.3329/jsf.v12i2.27732>
- Islam MS, Hamid A and Rahman MR (2019) Clinical waste management scenario of private health care establishment in Rajshahi City. *Trends in Civil Engineering and its Architect* 3(3): 408–415.  
<http://dx.doi.org/10.32474/TCEIA.2018.03.000161>
- Jackson N (1992) Application of state theory to ground water contamination incidents. *Geoforum* 23(4): 487–498.  
[https://doi.org/10.1016/0016-7185\(92\)90005-0](https://doi.org/10.1016/0016-7185(92)90005-0)
- Johnson H, South N and Walters R (2016) The commodification and exploitation of fresh water: Property, human rights and green criminology. *International Journal of Law, Crime and Justice* 44: 146–162.  
<https://doi.org/10.1016/j.ijlcrj.2015.07.003>
- Joyce A (2015) The river runs black: Pollution from Bangladesh's tanneries—In pictures. *Guardian*, 23 October.  
<https://www.theguardian.com/global-development-professionals-network/gallery/2015/oct/23/the-river-runs-black-pollution-from-bangladeshs-tanneries-in-pictures>
- Kamol E (2019) 46,742 river grabbers spotted in 61 districts. *New Age*, 11 September.  
<https://www.newagebd.net/article/84260/46742-river-grabbers-spotted-in-61-districts>
- Keegan M (2018) Where is the world's noisiest city? *Guardian*, 8 March.  
<https://www.theguardian.com/cities/2018/mar/08/where-world-noisiest-city>
- Leahy S (2018) From not enough to too much, the world's water crisis explained. *National Geographic*, 22 March.  
<https://www.nationalgeographic.com/news/2018/03/world-water-day-water-crisis-explained/>
- Lucini BA and Stryjak A (2017) *Bangladesh: Driving mobile-enabled digital transformation*. London: GSMA.  
<https://data.gsmaintelligence.com/api-web/v2/research-file-download?id=28999757&file=Bangladesh%20Driving%20mobile-enabled%20digital%20transformation.pdf>
- Lufkin B (2017) Why 'hydro-politics' will shape the 21st century. *BBC Future*, 16 June.  
<https://www.bbc.com/future/article/20170615-why-hydro-politics-will-shape-the-21st-century>
- Machingura F and Lally S (2017) *The sustainable development goals and their trade-offs*. Overseas Development Institute. <https://cdn.odi.org/media/documents/11329.pdf>
- Mahbub AI and Ahmed AIMU (2008) Underlying causes of deforestation and forest degradation in Bangladesh. <https://docplayer.net/21215545-Underlying-causes-of-deforestation-and-forest-degradation-in-bangladesh.html>
- Mahmood SAI (2011) Air pollution kills 15,000 Bangladeshis each year: The role of public administration and governments integrity. *Journal of Public Administration and Policy Research* 3(4): 129–140.
- Mahmud AH (2018) Waste management projects gone to waste. *Dhaka Tribune*, 12 February.  
<https://www.dhakatribune.com/opinion/special/2018/02/12/waste-management-projects-gone-waste>
- Mandal BK and Suzuki KT (2002) Arsenic around the world: A review. *Talanta* 58(1): 201–235.

- Mansoor N (2020) *Conceptualizing and realizing a smart city model for Bangladesh*.  
<https://arxiv.org/ftp/arxiv/papers/2012/2012.03055.pdf>
- McClanahan B, Brisman A and South N (2015) Privatization, pollution and power: A green criminological analysis of present and future global water crises. In Barak G (ed.) *The Routledge international handbook of the crimes of the powerful*: 223–234. London: Routledge.
- Massachusetts Institute of Technology (2009) Dissolved arsenic in Bangladesh drinking water is from human alteration of landscape. *ScienceDaily*, 16 November.  
[www.sciencedaily.com/releases/2009/11/091115134130.htm](http://www.sciencedaily.com/releases/2009/11/091115134130.htm)
- Molla MA-M (2018) River pollution in Bangladesh will be unbearable by 2050. *Daily Star*, 27 August.  
<https://www.thedailystar.net/news/city/river-pollution-bangladesh-will-be-unbearable-2050-1625035>
- Murphy E and King EA (2014) *Environmental noise pollution: Noise mapping, public health, and policy*. USA: Elsevier.
- National River Conservation Commission (2019) *Annual Report-2018*, Dhaka, Bangladesh, National River Conservation Commission, Bangladesh  
[http://www.nrcrb.gov.bd/sites/default/files/files/nrcrb.portal.gov.bd/annual\\_reports/0ffe594\\_6d3b\\_4e51\\_ab50\\_8a40ef458763/2019-12-28-18-20\\_23413db1c7218cd17ac1099de53641b8.pdf](http://www.nrcrb.gov.bd/sites/default/files/files/nrcrb.portal.gov.bd/annual_reports/0ffe594_6d3b_4e51_ab50_8a40ef458763/2019-12-28-18-20_23413db1c7218cd17ac1099de53641b8.pdf)
- Nelson J (2012) Who's profiting from the water crisis? *New Internationalist*, 1 May.  
<https://newint.org/features/2012/05/01/water-crisis-profit-opportunity>
- Parker J (2020) The 1798 poem that was made for 2020. *Atlantic*, 13 May.  
<https://www.theatlantic.com/culture/archive/2020/05/rime-ancient-mariner-was-made-2020/611602/>
- Rabbi AR (2020) 1 jailed for selling used PPE amid Covid-19 pandemic. *Dhaka Tribune*, 25 April.  
<https://www.dhakatribune.com/uncategorized/2020/04/25/1-jailed-for-selling-used-ppe-amid-covid-19-pandemic>
- Rahman KF (ed.) (2015) *Contemporary environmental challenges in Bangladesh*. Bangladesh: Concern Universal.
- Rahman MM, Bodrud-Doza M, Griffiths MD and Mamun MA (2020) Biomedical waste amid COVID-19: Perspectives from Bangladesh. *Lancet Global Health* 8(10): e1262. [https://doi.org/10.1016/S2214-109X\(20\)30349-1](https://doi.org/10.1016/S2214-109X(20)30349-1)
- Rahman MM, Mahamud S and Thurston GD (2019) Recent spatial gradients and time trends in Dhaka, Bangladesh, air pollution and their human health implications. *Journal of the Air & Waste Management Association* 69(4): 478–501. <https://doi.org/10.1080/10962247.2018.1548388>
- Ranjan A (2019) Bangladesh's rivers need urgent rehabilitation. *The Wire*, 22 July.  
<https://thewire.in/environment/bangladesh-rivers-pollution-waste-encroachment>
- Reza A and Hasan KM (2019) Forest biodiversity and deforestation in Bangladesh: The latest update. In Suratman MN, Latif ZA, Oliveira GD, Brunzell N, Shimabukuro Y and Dos Santos CAC (eds) *Forest degradation around the world*: 15–33. London: IntechOpen.
- Rodríguez Goyes, D, Mol, H, Brisman, A and South, N (eds) (2017) *Environmental Crime in Latin America: The theft of nature and the poisoning of the land*, London: Palgrave
- Rokon S (2020) River, rights and responsibility in Bangladesh. *Business Standard*, 17 August.  
<https://tbsnews.net/feature/river-rights-and-responsibility-bangladesh-120508>
- Sakamoto M, Ahmed T, Begum S and Huq H (2019) Water pollution and the textile industry in Bangladesh: Flawed corporate practices or restrictive opportunities? *Sustainability* 11(7): 1951.  
<https://doi.org/10.3390/su11071951>
- Sarkar M, Islam JB and Akter S (2016) Pollution and ecological risk assessment for the environmentally impacted Turag River, Bangladesh. *Journal of Mater Environmental Science* 7(7): 2295–2304.
- Smol JP (2002) *Pollution of lakes and rivers: A paleoenvironmental perspective*. London: Hodder Arnold.
- South N (2015) Green criminology, brown crime and problems of despoiling, disposal and de-manufacturing in global resource industries. In Wyatt T (ed.) *Hazardous waste and pollution: Detecting and preventing green crimes*: 11–25. London: Springer.
- South N (2017) Environmental crimes and harms: A green criminology approach and socio-legal challenges. In Bergin T and Orlando E (eds) *Forging a socio-legal approach to environmental harms: Global perspectives*: 20–37. London: Routledge.
- Stone CD (1972) Should trees have standing?—Toward legal rights for natural objects. *Southern California Law Review* 45: 450–501.
- Sultana A, Paul AK and Nessa MU (2020) The status of noise pollution in the major traffic intersections of Khulna Metropolitan City in Bangladesh and its possible effect on noise-exposed people. *European Journal of Environment and Earth Sciences* 1(5): 1–8. <https://doi.org/10.24018/ejgeo.2020.1.5.58>
- United Nations (2020) *Inequality in a rapidly changing world*. <https://www.un.org/development/desa/dspd/wp-content/uploads/sites/22/2020/01/World-Social-Report-2020-FullReport.pdf>
- United Nations Committee on Economic, Social and Cultural Rights (2002) *General comment no 15: The right to water* (Articles 11 and 12 of the International Covenant on Economic, Social and Cultural Rights). Brussels: European Community.

- van Swaaningen R (2021) Cultural bias in international criminology. *Oxford Research Encyclopedia of Criminology*.  
<https://doi.org/10.1093/acrefore/9780190264079.013.669>
- Vigil K (2003) *Clean water: An introduction to water quality and water pollution control*. Corvallis: Oregon State University Press.