C1 | CLIMATE CHANGE, ENVIRONMENTAL DEGRADATION AND HEALTH: CONFRONTING THE REALITIES[1]

Introduction

Worldwide, environmental conditions have changed more rapidly in the past half-century than at any other time in human history (McNeill, 2000). The almost unfathomable magnitude of human-induced environmental degradation since the Industrial Revolution, and the attendant impact on climatic conditions, has led scientists to characterize the post-1800 period as a new geologic era: the Anthropocene (Waters et al., 2016).

Most prominently, based on the work of more than 2,000 scientists in the 195-member-country UN Intergovernmental Panel on Climate Change (IPCC), there is overwhelming scientific consensus that climate change is taking place and that human activities – shaped by the forces propelling the global economy – are driving it. Importantly, climate change aggravates and is aggravated by many other forms of environmental degradation – that is, the depletion and contamination of the earth's air, water and land. These all, in turn, have an array of health consequences.

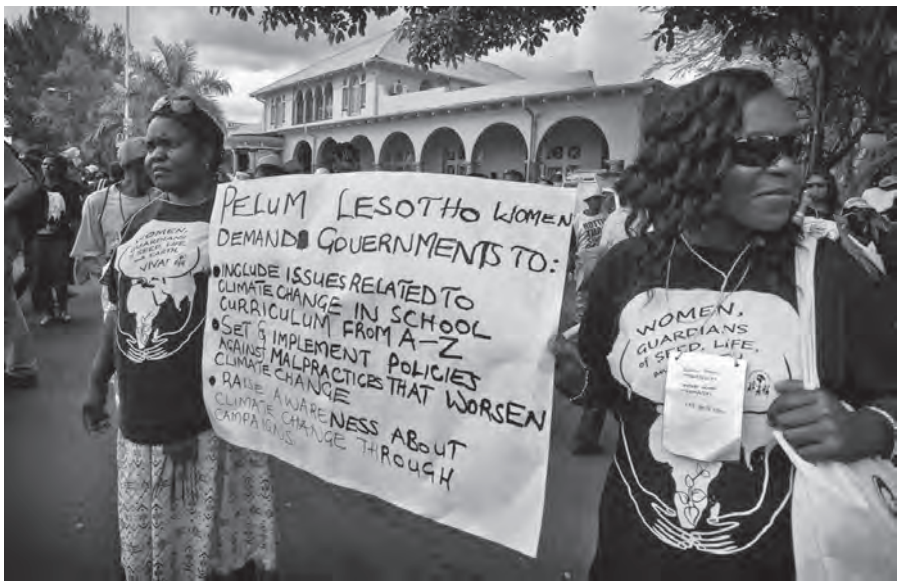

Image C1.1 Women in Lesotho advocating for climate literacy (Louis Reynolds)

Despite this broad consensus, and a shared understanding that climate change requires concerted global action – since its drivers and effects transcend borders and are shared globally (even as those bearing the brunt of climate change consequences are in low- and middle-income countries (LMICs)) –the global response has been timid and late in coming. This chapter reviews the underlying forces of climate change within the broader crisis of environmental degradation, and the consequent effects on human health and health inequities. We discuss what kinds of overall approaches are warranted and explore a range of promising, albeit insufficient, global, national and local responses and environmental justice movements. We also examine how the task of addressing the ongoing environmental degradation and dealing with the refusal by some governments to even acknowledge the existence of climate change, let alone act to mitigate it, will require creative and persistent forms of organization and mobilization.

Underlying forces (and consequences) of environmental degradation

While the effects of environmental contamination and resource depletion are typically experienced locally, the underlying drivers are global in nature – tied to market-based, consumption-driven, growth- and profit-oriented economies and their unsustainable industries, which affect the environmental landscape in a myriad of ways transcending geopolitical boundaries. Ultimately, global capitalism drives this destructive path (Foster, Clark and York, 2011). Under capitalism's contemporary phase of neoliberal globalization, the distance between consumption and the consequences of production is lengthened, masking how they are inextricably linked: people purchasing 'low-cost' clothing or electronics in, for example, Barcelona or Baltimore may not participate in, witness or even contemplate the environmental and human consequences of production in Bangkok or Bangalore. Moreover, in a global market economy, production costs rarely reflect social and environmental costs, from air pollution and chemical waste produced by garment factories to water and soil contamination from coltan mining, not to mention extreme labour exploitation.

Since contaminating and depleting natural resources do not directly affect profits, there is no inherent reason for businesses to refrain from production that harms the environment (or to make efforts to minimize these harms), notwithstanding the ubiquitous slick 'corporate social responsibility' campaigns that claim otherwise. Indeed, industrial production, mining, energy extraction and agribusiness are the prime generators of environmental degradation whenever they are not checked by effective government regulation.

Perhaps most illustrative, since the Second World War more than 85,000 new industrial chemicals have been produced and released into the environment with minimal testing or government oversight. This includes several thousand substances manufactured in vast quantities: 450 metric tons or more annu-

ally (Domínguez-Cortinas et al., 2013, pp. 351–57). Even when the harmful health and environmental effects are known and chemicals are regulated in high-income countries (HICs), as with benzene, they may still be exported, used and produced in LMICs with few regulations (Sellers 2014, pp. 38–71). The case of lead is telling in this context. Its toxicity was recognized as early as the 1890s, but it took nearly a century for mounting scientific evidence and activism to translate into its wide-ranging ban in gasoline and paints (Markowitz and Rosner, 2014).

Toxic waste is also an ever-present by-product of industrial production. Over 200 million people worldwide are directly exposed to dangerous waste toxins, and millions more are indirectly exposed (Blacksmith Institute and Green Cross Switzerland, 2014). Another key perpetrator of environmental contamination is the military–industrial complex, involving the production, testing, storage and detonation of both nuclear and conventional weapons, with the US and Russian military bases and munitions factories, especially, responsible for a toxic stew of dangerous chemicals linked to elevated cancer rates and reduced life expectancy among nearby populations (Blacksmith Institute and Green Cross Switzerland, 2013; Westing, 2008).

Resistance to landfills and industrial waste in Western Europe and North America has led HICs to enact stricter regulations against toxic dumping. But the practice continues illegally, especially through the annual export of at least 8.5 million tons of toxic waste to LMICs, where the largest hazardous dumpsites in the world are located (UNEP, 2011). Electronic waste (e-waste) – including consumer electronics such as computers, mobile phones and household appliances – increasingly ends up in Chinese, Indian and African landfills (UNEP, 2015). The world's largest e-waste dumpsite in Agbogbloshie (in Accra, Ghana) affects some 40,000–250,000 people living and working in proximity to lead, mercury and other metals that contaminate the air and soil (Blacksmith Institute and Green Cross Switzerland, 2013).

In the lucrative agribusiness sector, massive pesticide application and wasteful irrigation practices cause major soil and groundwater contamination and resource depletion. A whopping 70 per cent of the world's water is utilized by agriculture, mostly agribusiness (WWAP, 2014). Large-scale commercial farming is also associated with occupational safety and health concerns; farmer exposure to pesticides without adequate protection results in up to 5 million poisonings and 250,000 fatalities each year (Marrs and Karalliedde, 2012; Orozco et al., 2009, pp. 255–68), on top of the untold exposure of workers and local populations, such as communities in proximity to floriculture operations in Ecuador, to harmful toxins (Breilh, 2012).

The mining sector, meanwhile, remains one of the world's most profitable – and destructive – industries (see Chapter C5). Mining, whether of gold, uranium, cobalt, coal, other metals, rocks or minerals, invariably has devastating environmental consequences: stripped terrain and forests; mudslides; seepage

of heavy metals, acids and other toxic by-products into soil and watersheds; and the release of particulate matter and greenhouse gases that damage the ecological resources of nearby communities.

The energy sector is at the crux of any critical discussion on climate change and environmental degradation. Non-renewable fossil fuels – namely, oil, natural gas and coal – have extensive negative environmental effects through their extraction, refining and distribution. For example, every part of the oil extraction process, even before combustion, is hazardous to health due to spills, leaks, collision-related fires and the burning of 'excess' methane and other gases at oil wells, rigs and refineries – processes that also release carbon emissions into the air, contributing to pollution and climate change (Union of Concerned Scientists, 2015). Similarly, the emissions of 'cleaner fuels' such as natural gas remain associated with asthma, chronic bronchitis, cancers and blood disorders (Davoudi et al., 2013, pp. 7–19).

Further exacerbating carbon emissions and contamination is the conversion of raw bitumen from tar sands into crude oil – a process employed in Alberta, Canada. Communities near strip-mining, drilling and processing facilities are exposed to hazardous chemicals used in the conversion process, which are linked to elevated cancer rates downstream. These chemicals accumulate in the food chain, posing a particular threat to nearby indigenous communities who rely on hunting and fishing for their livelihoods (National Resources Defense Council, 2014). Unconventional gas and oil drilling through hydraulic fracturing (fracking), too, uses harsh chemicals, with massive water and air contamination potential (Saunders et al., 2016, pp.1–57).

And so, the forces driving the global economy shape and are shaped by the self-perpetuating cycle of human activities (extraction, production and consumption), in turn generating climate change and other forms of environmental degradation, all with detrimental health effects.

Leading environmental and health problems

The major health problems resulting from environmental degradation include air pollution and the overuse, misuse and contamination of water, land and forests in an intertwining of natural resource (ab)use with market-driven features of the built environment, jeopardizing the spaces and places where people work, play and live. According to a recent estimate, environmental factors – polluted air, built environment hazards, agricultural practices, occupational hazards, radiation, climate change, chemical exposures and inadequate water and sanitation – were associated with 12.6 million deaths (23 per cent of deaths worldwide) in 2012 (Prüss-Ustün et al., 2016).

Air pollution Air pollution is one of the most prevalent environmental problems, linked to industrial contamination, power plants, building heating and cooling, household fuel use and transport (including aircraft) exhaust. The

combustion processes that generate air pollution also contribute to climate change (Field et al., 2014).

Outdoor air pollution was an underlying factor in some 3.7 million premature deaths in 2012, nearly 90 per cent of them in LMICs (WHO, 2014a). Almost all city dwellers worldwide breathe unsafe air rife with particulate matter (PM), a mixture of fine solid particles, including dirt, dust, mould and, especially, aerosols formed from by-products of combustion: for example, sulphur dioxide and nitrogen oxides (WHO EURO, 2013). The health consequences of PM inhalation include lung cancer, cardiopulmonary diseases, and the aggravation of asthma and chronic obstructive pulmonary disease.

The problem is worse in many LMICs due to generally fewer controls on vehicle and industrial emissions; unregulated burning of household fuels and garbage; limited renewable energy source-based public transport; and large-scale industrial use of inexpensive high-sulphur fuels, including brown coal, as well as 'slash and burn' approaches to clearing land, such as for palm oil plantations in Indonesia.

India and Pakistan have the cities with the worst air pollution, topped by New Delhi whose 25 million inhabitants, especially children, face spiralling rates of upper and lower respiratory diseases (Mathew et al., 2015, pp. 421–27). India also has the highest mortality rate from respiratory diseases in the world at 155 deaths per 100,000 people (WHO, 2015a), with an estimated 1.3 million excess deaths annually due to air pollution. China, too, has record-breaking air pollution, especially in the most rapidly industrializing and urbanizing regions such as Hebei province. Still, per capita air contaminant emissions remain far higher in HICs, especially from vehicle exhaust (WHO, 2015b).

Indoor air pollution is even more deadly than its outdoor counterpart, responsible for a staggering 4.3 million annual deaths (WHO, 2014b). This is mostly caused by inhalation of biomass fuels (including animal dung, wood and logging waste, crop waste and coal) in poorly ventilated (open) heating and cook-stoves – involving approximately 3 billion people worldwide. Children, women and the elderly are particularly exposed to smoke and gases from cooking due to social roles keeping them indoors for long periods (WHO, 2016).

Waterways The basic human need of freshwater is wracked by intertwining problems of unequal access, scarcity and contamination. One-third of the world's population – predominantly in rural areas and informal settlements of LMICs – faces some level of water shortage or inadequate sanitation facilities (UNICEF and WHO, 2015), with particularly high water stress among displaced persons and refugees. Yet industrial and agribusiness interests capture public water supplies at discounted rates (WWAP, 2015), illustrating how water and sanitation access constitute a political problem of resource allocation rather than a primarily technical one.

To meet daily survival needs, billions of people must rely on contaminated water from rivers, streams, lakes and reservoirs or from rainwater collected in industrial barrels, usually lined with toxic chemicals**.** Ingestion of contaminated water and compromised hygiene can lead to a variety of bacterial illnesses such as cholera, typhoid and salmonella; skin infections; cryptosporidium infection and other parasitic diseases; and infection by food-borne pathogens. As well, toxins entering water supplies from industrial and agricultural run-off can cause acute poisonings and a variety of cancers.

Water- and sanitation-related diseases kill at least 1.4 million people each year (Forouzanfar et al., 2015, pp. 2287–323). Infants and malnourished young children are the hardest struck, with more than 750,000 dying annually from diarrhoea – 90 per cent attributable to unsafe/inadequate water and sanitation (UNICEF, 2015).

Anthropogenic climate change is also associated with the 'deadly trio' of ocean-related changes with health implications: ocean warming, acidification and deoxygenation (Burkett et al., 2014, pp. 169–94). The ocean absorbs one-third of global carbon dioxide (CO_2) emissions, accelerating acidification; meanwhile, oxygen levels have declined due to warming and everyday sources of contamination, including sewage, and chemical, agricultural and industrial run-off carried out to sea. These effluents create 'dead zones' where fish and other marine life can no longer thrive (Bijma et al., 2013, pp. 495–505), threatening food sovereignty and livelihoods for communities with seafood-based diets, such as northern Canada's Inuit population (Laird, Goncharov and Chan, 2013, pp. 33–40).

Land degradation and deforestation Arable land, which covers less than 10 per cent of the earth's surface, has been grossly overworked for decades. Land degradation – stemming from rising salinity levels due to deforestation and harmful agricultural practices such as overgrazing, poor irrigation, pesticide and fertilizer application, excess water use, over cultivation and mono-crop production – destroys 20,000–50,000 square kilometres of soil annually, with soil erosion rates up to six times higher in LMICs than HICs (Hester, 2012). The effects are dire for the approximately 1.5 billion people whose livelihoods depend upon farming and who are increasingly subject to food shortages, escalating poverty and forced migration (UNEP, 2014).

Large-scale deforestation – some 130 million hectares between 1990 and 2015 – is linked to intensive logging and clear cutting for construction materials, timber harvesting, domestic charcoal fuel, and urban and agricultural expansion (FAO, 2016). Deforestation jeopardizes health: it alters ecosystems' ability to remove pollutants from air and water, increases the spread of malaria, diminishes pollination and pest control, reduces the sources of new medicines and worsens the effects of floods, landslides, tidal waves and hurricanes (Whitmee et al., 2015, pp. 1973– 2028). LMICs are disproportionately affected: Haiti,

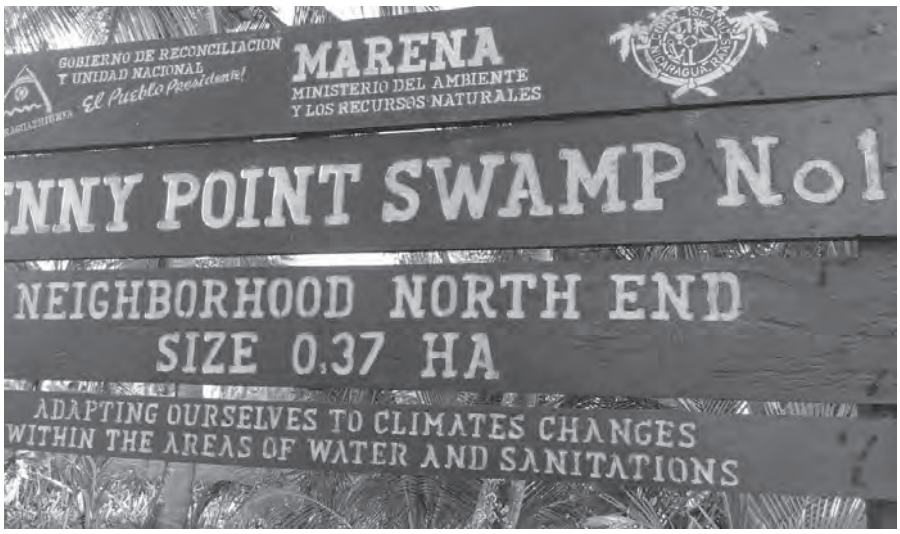

Image C1.2 Climate mitigation in Nicaragua (Mariajose Aguilera)

for example, has lost over 80 per cent of its original forest cover, exacerbating topsoil erosion, shrinkage of arable land and food insecurity (Swarup, 2009).

Climate change The predictions of dramatic environmental changes from climate change seemed improbable only a generation ago, yet today they already constitute lived experience for many (Baer and Singer, 2009). The greatest scientific certainty is around increase of surface and sea temperatures and ocean acidification. Other changes in all likelihood due to climate change are increased heat waves, melting polar ice caps, rising sea levels, heavy precipitation and droughts (Field et al., 2014).

Most directly, climate change is likely to increase the intensity and frequency of extreme heat events: between 1999 and 2010 there was a quadrupling of heat waves in Europe, leading to 70,000 excess deaths in 2003 alone (Christidis et al., 2012, pp. 225–39). In 2015, a heat wave in South Asia saw temperatures soaring to 49°C (120°F), killing approximately 2,500 people in India and 2,000 in Pakistan. Heat-related mortality involves dehydration and heat stroke, and the exacerbation of existing health problems such as heart, lung and kidney disease, and diabetes. Repeated dehydration can also lead to chronic kidney disease (Kjellstrom, Holmer and Lemke, 2009).

Secondary and indirect health consequences of climate change, mediated through environmental and ecosystem changes, stem from temperature and precipitation pattern changes that can be conducive to the proliferation and virulence of food- and water-borne pathogens, including enteric bacteria (for example, cholera) and viruses (Smith et al., 2014). For instance, heavy rainfall causes sewage overflow, allowing faecal waste run-off to contaminate surface

water; conversely, low rainfall and drought result in higher concentration of pathogens in the available water (El-Fadel et al., 2012, pp. 15–21).

Other secondary consequences include vector-borne diseases such as malaria, dengue and chikungunya, transmitted by temperature-sensitive arthropods. Even modest warming may enhance mosquito survival and reproduction, while rain and stagnant water create favourable breeding sites. Indirect health effects also extend to food sovereignty and nutrition. Droughts lower agricultural output and cause food shortages and under-nutrition in poor, already food-insecure areas (Smith et al., 2014).

Finally, there are tertiary, more diffuse health effects of climate change, mediated through economic, social and political factors. Heat waves, sea level rise, drought and other phenomena can lead to a whole range of stresses on well-being: livelihood loss, population displacement and social conflict, all affecting physical and mental health (McMichael, 2013, pp. 1335–43). For example, storms and floods have profound effects on people's mental health, leading to depression, anxiety and other forms of psychological distress, as has been documented in the aftermath of cyclones and floods in Bangladesh, which have hit women and the poor especially hard (Nahar et al., 2014). Populations forcibly displaced due to harsh, sudden or escalating environmental changes may experience similar mental health effects, plus under-nutrition, respiratory illness and increased maternal mortality (Smith et al., 2014).

All told, the World Health Organization estimates that climate change will cause an *additional* 250,000 deaths per year between 2030 and 2050 (WHO, 2014c). This is a conservative estimate, accounting only for deaths via direct pathways; the economic and social conflict effects are much greater, considering that there are over 1 billion people worldwide, living on ecologically fragile land (UNDP, 2015).

Spaces and places of inequity and injustice

As well as understanding how climate change-linked phenomena affect health, it is crucial to recognize that across and within countries, those most likely to be affected are impoverished, socially excluded and otherwise vulnerable people. For instance, during heat waves, the elderly, infants and young children are particularly susceptible to harm because their bodies are less adept at thermo-regulating. People living alone, outdoor workers, indoor workers in buildings lacking cooling mechanisms, and persons with chronic conditions, mental health problems and disabilities are also vulnerable during extreme heat events. Poverty worsens these conditions by limiting access to resources that mitigate heat stress; those from the lower socioeconomic groups die at higher rates during heat waves (Basu, 2015).

Virtually all health problems linked to environmental degradation are experienced most acutely by historically oppressed groups, such as African Americans in the USA. The concept of environmental racism, popularized

in the 1980s amid resistance to the siting of toxic landfills in predominantly African American communities in the US South, drew attention to the racialized dimension of environmental injustice (Bullard et al., 2008, pp. 371–411). Indigenous peoples are especially exposed to the injustices of environmental degradation. Due to the connection of indigenous livelihoods to the natural resources of their traditional lands, and to historic and ongoing political, economic and cultural oppression, many indigenous populations directly experience the consequences of environmental destruction (Ford, 2012, pp.1260–66). As highlighted by 'Idle No More', many indigenous groups are also at the forefront of resistance to abuses (Klein, 2014).

Environment and health inequities persist within both LMICs and HICs, but there is a difference between the two in the injustice experienced. It is a misconception that population size or growth per se drives these issues. Instead, even as ever-intensifying production, extraction and consumption patterns that lead to environmental degradation and climate change are deeply shaped by transnational corporations (TNCs) and HIC policies and population demands, those bearing the most deleterious effects are disproportionately located in LMICs. These include African countries and many small islands especially vulnerable to and burdened by the costs of climate change mitigation and adaptation efforts. Likewise, toxic waste largely generated in/by HICs is systematically exported to LMICs, together with the outsourcing of hazardous industries and jobs (Clapp and Dauvergne, 2011). Meanwhile, the TNCs reap the profits of exporting to LMICs hazardous products, such as certain pesticides, banned in HICs.

Though workers and consumers necessarily participate in the nexus of production and consumption, they do not control these economic activities or the global arrangements that sustain them, and the poorest, wherever located, benefit the least. Within and between countries, the uneven control and use of resources are central to the reproduction of capital, placing both HIC and LMIC elites literally and figuratively in the driver's seat of the economic order and of resource contamination and depletion. In sum, the high costs of environmental degradation and its health consequences are borne by those excluded from power and decision-making, even as the greatest advantages accrue to the more powerful (Brulle and Pellow 2006, pp. 103–24).

What is to be done?

With the massive health implications of fossil fuel energy dependence, large-scale agribusiness, hazardous waste dumping and other features of global capitalism, action is needed at all levels: global, national and local. The phasing out of chlorofluorocarbons (CFCs), a key contributor to ozone layer depletion, through the Montreal Protocol in 1987, stands out as a success in global co-operation for environmental protection, even as attenuating CFC effects is taking far longer than projected. But most other international efforts have

struggled to make concrete advances. The challenge of reaching consensus on obligatory greenhouse gas emission reduction targets, for instance, has made the Kyoto Protocol and its successor, the Paris Agreement, diluted, market-oriented and unenforceable responses to climate change.

The Paris Climate Agreement, which entered into force in 2016, is at best insufficient to achieve its central goal of limiting the global rise in temperature to below 2°C above pre-industrial levels. At worst, given that national emissions reduction targets are voluntary, with no penalties for non-compliance, the agreement may be of little use – especially given President Donald Trump's June 2017 announcement that the USA intended to withdraw from the agreement. Trump also made clear that the USA would not fulfill its US$ 3 billion pledge to the Green Climate Fund, which was set up to support climate change mitigation and adaption efforts in low-income and otherwise vulnerable countries. As the second largest current per capita CO_2 emitter, and largest cumulative CO_2 emitter in history, the United States's decision to withdraw from the Paris agreement clearly signals its unwillingness to participate in global efforts on climate change, even as China, India, and multiple European Union countries have reaffirmed their commitments. Still, even if it were fully implemented by all parties, the Paris Agreement provides no panacea – ultimately it sidesteps addressing climate change's economic, social and political drivers.

At the national level, governments can undertake a wider range of policy and regulatory actions to slow some of the driving forces of climate change and environmental degradation by setting regulations, standards (for example, air and water quality) and green taxes; holding corporations accountable (including for their practices overseas); and enabling the development and use of sustainable technologies and energy sources. The 2007 regulation of the European Union (EU) – Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) – is a promising approach: all companies are required to "identify and manage the [health and environmental] risks linked to the substances they manufacture and market in the EU" or face regulatory restrictions (ECHA, 2015).

China, now the world's largest greenhouse gas emitter with the fastest growing industrial sector and major mining and energy extraction interests across the world, has started to address health and environmental consequences, especially as they manifest in dangerous levels of air pollution in its industrial belt. Yet while China has invested in renewable energy, electricity and public transport alternatives, and has closed polluting factories, it continues under a global capitalist drive. Other burgeoning polluters with major industrial, energy extraction and mining interests, such as India, Pakistan, Russia, Nigeria, Indonesia and Brazil, are strangled by moneyed interests at the national level, leaving transformative change to the local level.

Indeed, many of the most progressive advances in environment and public health protection occur at local levels. Municipal initiatives for green/healthy

cities show the merits of ecological planning and design for reducing carbon emissions through investment in public transport, bicycling infrastructure, ecological housing and buildings, and urban agriculture – efforts that reduce the carbon footprints of cities and towns. For example, in Curitiba, Brazil, decades of ecological urban planning has produced one of the world's most efficient bus rapid transit systems and an extensive recycling system, while in Amsterdam, the Netherlands, a network of bicycle paths allows a third of all trips to be made by bike. Cuba, meanwhile, has provided a model of organic urban agriculture, enabling it to attenuate food shortages and improve nutrition, ban chemical pesticides, generate sustainable employment and move towards a carbon-neutral economy.

There are also individual – and household – level responses that encourage an array of lifestyle adaptations: using eco-friendly products; recycling and composting; home gardening; using energy efficient appliances; expanding the use of public transport, biking and walking; lowering thermostats in the winter; reducing or eliminating the use of air conditioners; and limiting car use or using fuel-efficient vehicles. Of course, appealing to the individual assumes that people have the time, access and resources, or the education or desire to make these behavioural changes, making these responses far more relevant to middle-to-high-income residents of middle-to-high-income countries than to members of the working class or people in low-resource settings.

Effective as some of these efforts can be, they offer only a first step in transforming the profit-oriented, polluting global political economic order. For example, individual- or household-level solutions do not affect underlying structural determinants, including energy, industrial and military production and waste processes that drive global environmental degradation. And the most forward-looking local policies cannot supersede the effects of pro-TNC industrial production policies and subsidies at the national level.

Moreover, the impact on equity must be assessed for all responses. To illustrate, while technological innovations, such as renewable energy and water desalination, can provide effective solutions at all levels, they do not in and of themselves address the equitable distribution and control of resources needed to attain environmental justice.

By contrast, environmental justice movements and resistance, from local to transnational, often take issues of inequity directly to the sources – confronting agribusiness, energy, mining and other industrial interests. Methods for seeking justice include litigation, divestment campaigns, advocacy and protest.

Farm-worker lawsuits brought by Latin American and US lawyers have been among these effective channels. For example, in 2002, chemical TNCs like Dow, Shell and Dole were ordered to compensate almost 600 Nicaraguan banana workers US$ 490 million. The workers had been sterilized by the hazardous pesticide Nemagon, banned in the late 1970s in the USA but utilized for many more years in US-owned plantations in Latin America, Asia

and Africa (Boix and Bohme, 2012, pp. 154–61). Still, while such lawsuits may meaningfully affect policies in legalistic societies, they may be less useful where legal costs and legal systems are inaccessible, and they can drag on for years. For instance, Chevron (then Texaco) engaged in dirty methods to extract oil in Ecuador for nearly 30 years, dumping billions of gallons of toxic waste, including 19 million gallons of oil spilled from a pipeline. Although the company left the area in 1992 and litigation has been ongoing for over 25 years, the community has yet to be compensated for health and environmental damages amid continuing litigation (Kimerling, 2013, pp. 241–94).

In another vein, divestment from fossil fuels, spearheaded by environmental organizations such as 350.org, entails getting rid of stocks, bonds and other investments linked to fossil fuel industries. Echoing divestment campaigns against apartheid South Africa, these largely HIC efforts seek to delegitimize and eventually eliminate major greenhouse gas-emitting industries. As of early 2017, there were over 700 institutions worldwide that had committed to the fossil fuel divestment campaign, totaling over US$ 5.4 trillion (Fossil Free, 2017).

Numerous civil society organizations are mobilizing resources to bear witness to corporate abuses and government neglect, and are advocating for rights and policies that are protective of the environment and health. Among these, La Via Campesina, an international movement of peasants, small- and medium-sized producers, landless people, rural women, youth, indigenous groups and agricultural workers, advocates for food sovereignty, preservation of natural resources, sustainable agriculture, gender equity and fair economic relations. Its efforts are closely tied to land rights activism and the resistance against displacement, which is often a crucial part of environmental struggles globally.

Protest is a powerful form of resistance, while also being potentially dangerous for activists. With mining alone, there have been numerous resistance efforts in recent years, often led by indigenous groups. From Apurimac, Peru, to Papua province, Indonesia, local communities have protested mining operations due to environmental pollution that affects their daily lives. In North Dakota, USA, the nearly year-long protest by the Standing Rock Sioux tribe and allies against the Dakota Access Pipeline cited indigenous treaty rights to land and water, initially persuading a halting of the pipeline plan by the Obama administration, later reversed under Trump.

Elsewhere, years of resistance in El Salvador led in 2017 to a path-breaking nationwide ban on metal mining to protect the nation's fragile water supply from contamination by toxic mining tailings. This illustrates how widespread civil society mobilization can embolden state legislatures to value environmental protection over good standing with TNCs (MiningWatch Canada, 2017).

Whatever the means for pursuing environmental justice, what is needed are paradigms that question the global political economy and provide ecological alternatives. Degrowth is one framework that critiques economic growth as a necessary social objective and capitalism as a system that necessitates and

Image C1.3 Demonstration in Melbourne for measures against climate change (PHM Australia)

perpetuates growth. It promotes the prospect of a smaller society (in terms of production and consumption) and of re-structuring society away from commodification and toward other functions, such as economies of care and the reclaiming of commons – the shared management and responsibility for resources (Kallis, Demaria and D'Alisa, 2015). 'Buenvivir', a contemporary indigenous development in the Andean region of Latin America, questions conventional assumptions about 'growth' and 'development' and their links to well-being. Instead, buenvivir calls for a new paradigm of 'living well' in harmony with the natural environment and within existing resources.

Still, it is questionable whether concrete measures framed around degrowth or buenvivir go far enough to question capitalism, as seen in countries like Ecuador, which has enshrined buenvivir and the rights of nature in its Constitution but continues to depend on resource extraction as a vehicle for development. Of course, Ecuador per force operates within a global market order: alternative paradigms have the potential to generate lasting change by raising consciousness, shifting values and ultimately pressuring political processes towards the building of societies that favour equity over growth.

Conclusion

Although manifesting distinctly in different locales, environmental degradation and its health consequences are interrelated across the world, transcending place and ultimately affecting everyone (McMichael, 2013, pp. 1335–43). The human population is now at a crucial crossroads. Addressing the myriad environmental challenges and their interconnected health effects is complex and difficult, and will require broad co-operation, creative ideas and intense political struggle.

Alas, the present reality is one of substantial political recalcitrance to transformative change by some of the largest polluters. Among the early measures adopted by the Trump administration are a proposed 30 per cent budget cut to the US Environmental Protection Agency (EPA), relaxing of clean water regulations (Jaffe, 2017, pp.1180–81), reviving of major oil pipeline projects, overturning a moratorium on new coal mining leases and derailing the Obama administration's Clean Power Plan, which sought to implement regulations that would curb greenhouse gas emissions. Outrageously, Trump's choice for head of the EPA, former Oklahoma attorney general Scott Pruitt, has a history of close ties to the fossil fuel industry (Davenport and Lipton, 2017) and has openly questioned the anthropogenic factor in climate change and advocated against (including by partaking in lawsuits) many of the EPA's regulations.

But even those governments that recognize climate change and have publicly committed to the Paris Agreement remain mired in the contradictions of an environmentally degrading, climate change-producing global capitalist system. Canada, for example, having abandoned the Kyoto Protocol, has signed the Paris Agreement, yet continues to provide billions of dollars in government support (tax breaks, subsidies, approvals and lax securities/regulation) to tar sands exploitation, the mining industry and to building two giant pipelines.

Meanwhile, as per the example of El Salvador, smaller countries are taking the most transformative and even desperate measures, given the immediate and current effects of environmental degradation on population well-being. While it is inspiring that a small and vulnerable country has taken such a bold move, it remains shameful that for the principal environmental perpetrators – chiefly TNCs and their government partners – for the most part it is business as usual. If Naomi Klein is correct in arguing that 'this changes everything', political and social movements everywhere will need to participate in their own Leap Manifesto: a call for a new buenvivir-type ethic of a society based not on profits but on caring for one another and the earth (The Leap Manifesto, 2015).

Note

1 This chapter draws heavily from Birn, Pillay and Holtz (2017, Ch. 10).

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