Chapter 13
International Changes in Environmental Conditions and Their Personal Health Consequences

Beth Ann Fiedler

Abstract Earth in the balance must consider the international changes in the physical and social environmental conditions resulting from global climate change, economic development, conflict, and other factors. Regardless of what side of the political fence individuals may land relating to climate change, the mounting evidence of air pollution, hazardous chemicals, water scarcity, land conversion, and biodiversity loss are evident. So too is their link to increased metabolic risk factors that damage human organ systems eliciting negative health outcomes (e.g., asthma, neurobehavioral disorders, and zoonotic infectious diseases) leading to morbidity and mortality. Together, these environmental and consequent health conditions should prompt civic engagement to reduce shared risks and consequences. This chapter reports a broad scope of the health disorders from the leading global environmental causes of death, such as pollution, land degradation and land use, providing an overview of key environmental and social problems and social responsibilities facing less-developed, emerging, and industrialized nations. Then moves on to discuss social considerations in two areas: (1) public participation found in environmental impact assessments, and (2) how income inequality in the social environment and social foundation may impact government structure and capitalism. Finally, the chapter brings forth multi-government levels of environmental and public health resources in the United States to prompt civic engagement, address personal behavior patterns and environmental risks. The chapter concludes with a discussion on the role of individual participation towards resolving environmental conditions and their health consequences.

B. A. Fiedler (✉)
Independent Research Analyst, Jacksonville, FL, USA

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13.1 Introduction

Two important factors that help to determine the risk of susceptibility to environmental conditions that impact health mortality and morbidity are age and the predominant national economic development status of the country in which you are born and develop. Birth location may have the greatest potential impact on the capacity to obtain basic needs, to improve circumstances through opportunity, and the ability to live in a healthy environment as a predictive measure of quality of life. While environmental impact on health can be felt by all age groups, the World Health Organization (WHO) directs attention to the wide array of environmental risks that disproportionately affect the most vulnerable people in the global population in these primary categories—(1) age (e.g., children aged 5 years or less, adults between the ages of 50 and 75), and (2) economic status (e.g., country populations characterized by low and middle class socioeconomic status prevalent in regions such as Southeast Asia, Africa and the Western Pacific) (WHO 2017a).

The term vulnerable population was introduced at the turn of the millennium to differentiate the global population who were "at risk of poor physical, psychological, or social health" (Aday 2001, p.10). However, the U.S. Global Change Research Program has further described vulnerability in terms that directly relate to climate change for individuals, communities and the institutions that guide them. They are (1) exposure representing contact opportunities in which climate stressors can elicit biological, psychosocial or other responses, (2) sensitivity which is the degree a community may be impacted by environmental stressors, and (3) adaptive capacity of the community and existing institutions to respond to known or emerging predictors (USGCRP 2016). Their key findings indicate with high confidence that, "Social determinants of health, such as those related to socioeconomic factors and health disparities, may amplify, moderate, or otherwise influence climate-related health effects, particularly when these factors occur simultaneously or close in time or space" (USGCRP 2016, p.248).

WHO reports that 12.6 million people die annually from environmental conditions representing "23% of all global deaths" (WHO 2017a, p.1). These population segments represent the growing number of people in the global population who are highly susceptible to the increasing number and variety of environmental contaminants (e.g., air pollution, the built environment, deficient sanitary water supply, and hazardous chemicals and waste) contributing to annual morbidity and mortality. The public health impact of environmental conditions, while prominent in less-developed/emerging nations, is getting personal to a greater span of the global population. Further, developed nations are not immune to the personal impact of environmental conditions. Empirical evidence from studies in the US and the European Union (EU) find that environmental hazards, such as air pollution, are associated with toxic and debilitating effects to the human body organ systems (e.g., endocrine, respiratory, cardiovascular, and reproductive) (Colao et al. 2016). While country of origin may foster a better start, the reality is that the long-term effects of environmental conditions can impede global quality of life.

Table 13.1 The World Bank Group world development indicators: global morbidity vulnerability for under age 5 years and noncommunicable and communicable diseases for all ages

Socioeconomic status[†a]	Under age 5 years Death[a]		Deaths Noncommunicable diseases % of total[††b]		Deaths Communicable diseases % of total[†††c]	
	2000	2015	2000	2015	2000	2015
High income	96,333	67,940	87.19	87.81	6.63	6.59
Upper middle income	1,405,443	714,548	77.62	83.44	12.18	8.14
Lower middle income	5,715,967	3,478,060	46.13	59.02	44.91	31.10
Low income	2,565,058	1,683,991	23.00	36.89	68.49	51.95

Source: [a]The World Bank 2017a; [b]The World Bank 2017b; [c]The World Bank 2017c
Notes: [†]Socioeconomic status is based on the 2015 Gross National Income (GNI) per capita defined as the average income per citizen. Low-income economies was $1,025 or less such as Afghanistan, Uganda, and Liberia; Lower-middle income between $1,026 and $4,035 such as Angola, India, and Micronesia; Upper Middle income between $4,036 and $12,475 such as Brazil, Bosnia and Herzegovina, Russian Federation, and Panama; and High-income was $12,476 or more such as France, Greenland, Ireland, Latvia and New Zealand
[††]Cause of death refers to all ages attributed to chronic conditions such as cancer, diabetes mellitus, hereditary irregularities, and diseases of the skin, cardiovascular system, digestive system, and musculoskeletal system
[†††]Cause of death refers to all ages attributed to communicable (infectious) diseases and maternal, prenatal and nutrition conditions (e.g., infectious and parasitic diseases), respiratory infections, and nutritional deficiencies

Consequently, a prominent United Nations Sustainable Development "Goal 3: ensure healthy lives and promote well-being for all at all ages" (United Nations 2017, *para* 1) is a primary focus. Even though health goals are intended to apply to all age, Table 13.1 demonstrates that there are age and national socioeconomic factors that require more attention. For example, more than 5 million deaths in children 5 years and under occurred in low- and lower middle-income nations in 2015 (World Bank 2017a). "In 2015, the global neonatal mortality rate was 19 per 1000 live births and the under-five mortality rate in 2015 was 43 per 1000 live births, representing declines of 37% and 44% respectively from 2000" (WHO 2017b, *para* 14). Hoping to gain momentum on the downward trend, the WHO has challenged the globe to "reduce neonatal mortality to at least as low as 12 per 1000 live births and under-5 mortality to at least as low as 25 per live births" (2017b, *para* 13).

A simultaneously aging and growing population contributes to the rising percent of the total population struggling with one or more forms of noncommunicable disease (NCD) evident across all national socioeconomic status categories from 2000 to 2015 (World Bank 2017a, b; WHO 2017b). NCDs, historically considered diseases of the elderly, have a growing impact on adults starting at age 30. While "the probability of dying from chronic disease, such as diabetes, cancer, cardiovascular disease and chronic lung disease between ages 30 and 70 is 19%, a 17% decline from 2000" (WHO 2017b, *para* 19), there remains an upward momentum (Table 13.1). WHO targets a one-third global reduction in premature noncommunicable disease mortality through a preventive medicine and holistic approach to

physical and mental health (WHO 2017b) to reduce the "15 million people [who] die from a NCD between the ages of 30 and 69 years; over 80% of these 'premature' deaths [about 31 million] occur in low- and middle-income countries" (WHO 2017c *para* 2, 9).

The availability of vaccines and distribution channels contribute to the decreasing percent of total deaths from communicable diseases from 2000 to 2015 (Table 13.1) (World Bank 2017c). However, there remains a need to address continuously emerging strains of infectious diseases often brought forth from ecosystem encroachment that dislodges animal, insect, and plant life habitats with unforeseen impact on the human population (WHO 2017d).

Minimizing these risks and others are key to "protecting children and achieving the Sustainable Development Goals" (WHO 2017a) that includes targeting poverty and preventing associated health risks, such as NCDs. Stroke, ischemic heart disease, unintentional injuries, and cancer are the top four leading NCD causes of adult deaths accounting for nearly two-thirds of deaths attributed to existing environmental risks (WHO 2017a, p.2). The fifth largest global cause of death is chronic respiratory diseases (WHO 2017a, p.2) while respiratory infections are the leading cause of death in children under the age of 5 (WHO 2017e, p.1). Economic inequality is often problematic for pulmonary conditions concurrent with health inequality. Implications for poor respiratory and long-term health problems are also high for impoverished children as well as adults who are exposed to occupational health hazards (The Lancet Respiratory Health 2017). Outdoor air pollution, a composition of harmful airborne particles containing particulate matter such as lead and aerosols, is a contributing factor to these metabolic risk factors (Colao et al. 2016; Solomon 2011). "Exposure to ambient air pollution increases morbidity and mortality, and is a leading contributor to global disease burden" (Cohen et al. 2017, p.1907). Indoor air pollution, a result of hazardous chemicals and building materials, and outdoor pollution in 2012 caused "an estimated 6.5 million deaths globally, or 11.6% of all deaths" (WHO 2017b, *para* 32).

The Global Burden of Disease (GBD) risk factor study reports some improvements in risk factors such as the risk of child undernutrition dropping from rank 3 in 1990 to 18 in 2015 (Cohen et al. 2017, p.1911; Global Burden of Disease Study (GBD) 2016). However, high systolic blood pressure remains the highest risk overall and the leading metabolic risk while smoking remained second overall and the leading behavioral risk. Ambient particulate matter pollution dropped one notch from rank 4 overall in 1990 to 5 in 2015 but remains the highest environmental or occupational risk (Cohen et al. 2017, p.1911; Global Burden of Disease Study (GBD) 2016).

Unavoidably, the existing environmental and social conditions leading to negative health outcomes are linked to where we live, work, and play. Is the cost of economic development a disproportionately high price to pay for an elevation in social status that may increase access to some higher quality products while simultaneously exposing the population to new risks? This chapter provides an overview of the key environmental problems plaguing the globe from the perspective of less-developed/emerging nations and industrialized nations, define key social considerations from various perspectives, and supply public resources promoting informed, civic engagement.

13.2 Key Environmental Problems

The public health ramifications of environmental problems are global. Among the many credible lists of environmental indicators, such as the list generated by the Organization for Economic Development and Cooperation (OECD 2008a, b), there is an overarching short list—pollution, land degradation, and land use from which many other environmental hazards are derived. For example, pollution can describe poor air quality, contaminated freshwater supply, or ocean acidification, and thus endangered fisheries, due to airborne contaminants (EPA 2017a; Solomon 2011). In the same way, land degradation speaks to soil erosion and chemical contamination while land-use decisions continue to destroy rural areas in favor of urban development leading to biodiversity loss and land conversion (OECD 2001, 2017a, b). However, there are distinctions between countries that are less-developed and emerging and those who have already achieved industrialization. Nonetheless, the short-list of three environmental indicators can account for numerous environmental risks, indicate national human and economic development status, and contribute to the primary causes of poor public health.

13.2.1 Environmental Problems in Less-Developed and Emerging Countries

Environmental conditions in lesser developed and emerging countries (e.g., Brazil, India, and Mexico) are exacerbated by poverty where overpopulation destructively taps into increasingly limited natural resources (Anand 2013; Cassar 2005). Another prevailing problem faced by these countries is the lack of infrastructure prohibiting access to clean water and sanitation (Anand 2013). The National Council for Science and the Environment (NCSE 2017, *para* 1) defines sustainable infrastructure:

> Broadly defined, infrastructure is the interconnected system of the physical, natural and social components that societies need to survive and function. To make infrastructure truly sustainable, it must not only provide these services, but also take into account the risks and opportunities it generates arising from the bricks, mortar, and financing required to build and sustain the system as well as the environmental and human impacts of the system itself.

Sustainable infrastructure represents the process of improving existing built systems (e.g., buildings, bridges, waste management, and transportation) and natural systems (e.g., waterways). The process also incorporates new structures to facilitate the needs of a given community.

Lack of national funds and a limited number of trustworthy institutions, if any, to distribute medical, food, and water supplies or to otherwise support social services adds another dimension to the problem. Fundamental logistics, even when funds are available and there are trusted institutions, become problematic because of the difficulties in reaching people due to poor infrastructure and the remote nature of some populations. Thus, the cascading impact of poverty permeates

throughout the environment and is evident in multiple and inter-related conditions that cumulatively contribute to poor public health.

Urban population growth and low socioeconomic status often combine to form the "synergistic problems of urban poverty, traffic fatalities and air pollution" (WHO 2017f, *para* 2). Reduced access to open spaces and/or the presence of various pollutions deters urban dwellers from physical activity. In turn, lack of physical activity then contributes to the leading causes of death from NCDs. Further, if you combine the effects of these environmental conditions with the consequences of personal habits of irresponsible alcohol consumption, smoking, and poor eating habits, such as a diet high in sodium or low in whole grains and fruits, risk of early onset of various diseases can rapidly increase the likelihood of the impact on systemic organ systems leading to a decline in function. Granted, some dietary and other choices can be a product of the environment—lack of access to fresh food due to lack of transportation or low income. Nonetheless, the consequences of the human body expending energy to repair the damages from these behaviors weaken the capacity to remove toxins because of these behaviors and environmental conditions.

The burden on natural resources (e.g., forests, minerals, fisheries, wildlife) is evident in developing nations where they are the only source of raw materials, such as wood, that are accessible to the population. Often, these nations do not have any policy in place to limit the level of destruction. Finally, the desire to emerge from poverty places further stress on resources and puts the globe at risk through the introduction of new chemicals and materials, as well as those banned in other countries such as asbestos (Al-Delaimy 2013), as poorer countries reintroduce less expensive but often more dangerous materials and processing methods (WHO 2017c) to keep pace with industrialized production.

13.2.2 Environmental Problems in Developed Countries

One word,overconsumption, characterizes the waste demonstrated in developed nations such as the US and EU member states that have prospered from twentieth-century industrialization. A quick view of the national ecological footprint, the difference between the biocapacity of a nation and what they utilize, demonstrates the global imbalance (Global Footprint Network 2017a). "Overall, the developed world has 23% of Earth's population but consumes two-thirds of the resources" (Anand 2013, p.1). The fundamental problem is clear—an overabundance of goods produced at the expense of natural resources. Industrial consumption—the consequence of production and the multiplicity of products, also "affect the environment through the emission of greenhouse gases and other wastes" (Anand 2013, p.2).

Table 13.2 demonstrates the large per capita carbon dioxide (CO_2) emissions from the countries in North America—Bermuda, Canada, and the United States—at 16.11 metric tons per capita in 2013 (World Bank 2017d). However, there is also a decline of nearly 4 metric tons per capita from 2000 to 2013 while other regions are increasing emissions. Relevant to note is that per capita reporting of statistics

Table 13.2 The World Bank world development indicators for carbon dioxide (CO_2) emissions from burning fossil fuels, cement manufacturing processes, and gas-flaring

Socioeconomic status[a]	Regional associations[b]	Carbon dioxide emission (metric tons/capita)	
		2000	2013
High income		12.27	11.04
Upper middle income		3.56	6.62
Lower middle income		1.07	1.43
Low income		0.03[c]	0.28[c]
	Arab World[1]	3.68	4.64
	Central Europe & Baltics[2]	6.61	6.35
	East Asia & Pacific[3]	3.20	6.34
	European Union[4]	8.00	6.73
	Latin America & Caribbean[5]	2.55	3.05
	Middle East & North Africa[6]	4.65	5.91
	North America[7]	19.93	16.11
	Organization for Economic Cooperation and Development[8]	11.06	9.68
	Sub-Saharan Africa[9]	0.846	0.82[c]

Source: The World Bank 2017d

[a]Socioeconomic status is based on the 2015 Gross National Income (GNI) per capita defined as the average income per citizen. Low-income economies were $1025 or less such as Yemen, Mali, Nepal, and Chad; Lower-middle income between $1026 and $4035 such as Georgia, Armenia, Paraguay, Indonesia, and Sudan; Upper-middle income between $4036 and $12,475 such as Turkey, Costa Rica, Romania, and Peru; and High-income was $12,476 or more such as Austria, Sweden, Canada, Saudi Arabia, and Israel

[b][1]Algeria, Bahrain, Comoros, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, Somalia, Sudan, Syrian Arab Republic, Tunisia, United Arab Emirates, West Bank and Gaza, and Yemen; [2]Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic, and Slovenia; [3]American Samoa, Australia, Brunei, Darussalam, Cambodia, China, Fiji, French Polynesia, Guam, Hong Kong, Indonesia, Japan, Kiribati, Korea, Lao, Macao, Malaysia, Marshall Islands, Micronesia, Mongolia, Myanmar, Nauru, New Caledonia, New Zealand, Northern Mariana Islands, Palau, Papua New Guinea, Philippines, Samoa, Singapore, Solomon Islands, Thailand, Timor-Leste, Tonga, Tuvalu, Vanuatu, and Vietnam. [4]28 members of EU in 2013: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Spain, Sweden, and United Kingdom; [5]Antigua and Barbuda, Argentina, Aruba, Bahamas, Barbados, Belize, Bolivia, Brazil, British Virgin Islands, Cayman Islands, Chile, Colombia, Costa Rica Cuba, Curacao, Dominica, Dominican Republic, Ecuador, El Salvador Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica. Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Sin Maarten (Dutch), St. Kitts and Nevis, St. Lucia, St. Martin (French), St. Vincent and the Grenadines, Suriname, Trinidad and Tobago, Turks and Caicos Islands, Uruguay, Venezuela, and Virgin Islands; [6] Algeria, Bahrain, Djibouti, Egypt, Iran, Israel, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates, West Bank and Gaza, and Yemen; [7]Bermuda, Canada and the United States; [8] United States, United Kingdom, Turkey, Switzerland, Sweden, Spain, Slovenia, Slovak Republic, Portugal, Poland, Norway, New Zealand,

(continued)

Table 13.2 (continued)

Netherlands, Mexico, Luxembourg Latvia, Korea, Japan, Italy, Israel, Ireland Iceland, Hungary, Greece, Germany, France, Finland, Estonia, Denmark, Czech Republic, Chile, Canada, Belgium, Austria, Australia; [9]Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Congo, Cote d'Ivoire, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia, Zimbabwe

[c]Rounded to two decimal places except for numbers <1 that are listed at three or more decimal places

may require further interpretation beyond face value. For example, the population of China, one of 37 nations in the East Asia & Pacific region, was 1.354 billion in 2013 while Bermuda (65,091), Canada (34,881,000) and the United States (316,103,330) combined for 351, 049, 021 or about 25% of the population of China alone. According to 2014 estimates from research conducted with the Carbon Dioxide Information Analysis Center (CDIAC), a subgroup of the United States Department of Energy, mainland China tops the list of fossil-fuel burning, cement production, and gas flaring emission with 2,806,634 thousand tons of carbon, almost twice the emissions of the US at 1432855 thousand tons of carbon (Boden et al. 2014, 2017) who has been steadily decreasing emissions. Individual consumption in North America is larger per capita but the actual amount of CO_2 emissions emanating from the East Asia & Pacific region is greater. Thus, reporting national emissions per capita when population size is a factor can be misleading. Finally, national governments take the hit for overconsumption and growing consumption that impacts the globe, but the accumulation of individual consumption is critical to the consumption direction of each national population. This brings forth the important element of the individual contribution to international changes in environmental conditions and their personal health consequences.

Nothing brings the problem of overconsumption in developed nations to the fore like the global problem of e-waste. "E-waste refers to all types of electrical or electronic equipment (EEE) and its parts that have been discarded without intention for reuse by the owner" (Heacock et al. 2016, p.550). The largest public health factor in the persistent practice of e-waste recycling is the "elevated concentrations of various industrial-use Persistent Organic Pollutants (POPs), such as polychlorinated biphenyls (PCBs)" (Breivik et al. 2016, p.798). PCBs and other POPs are expected to continue to escalate the problem of global emissions.

Approximately 80% of the 2014 estimated global e-waste of 41.8 million tons (Breivik et al. 2014; Heacock et al. 2016, p.550) was redistributed to less-developed/emerging nations in Africa and China (Heacock et al. 2016, p.551; Lundgren 2012). Developed and some emerging nations illegally send e-waste to less-developed/emerging nations who illegally receive these items under the guise of resale. International shipping guidelines, such as the Basel Convention of the United Nations Environment Program, ban this process of disposal (Heacock et al. 2016). Nevertheless, these nations use these discarded items as a waste recycling resource

to recover valuable commodities such as iron, copper, and gold. However, e-waste sites are not regulated and do not offer a safe extraction method or protection against hazardous elements contained in these products, such as mercury and lead, when ad hoc dumping sites draw unprotected workers to disassemble these products. Toxic poisoning resulting from handling materials directly or water consumption drawn from streams where heavy metals (e.g., mercury, lead) have accumulated results in damage to the brain and nervous system. Developing systems are highly susceptible as common routes of lead exposure to youth occur during the first few years of development while pregnant women exposed to mercury can seriously harm the fetus.

China, a consumer and recipient of e-waste, is one of several Asian nations who are remedying the problem with an increase in environmental legislation and in the establishment of institutions that are responsible for monitoring and oversight (Honda et al. 2016). "As a continent, Asia generates the highest volume of e-waste, estimated at 16 million tonnes in 2014. However, on a per capita basis, this amounts to only to 3.7 kgs per inhabitant, as compared to Europe and the Americas, which generate nearly four times as much per capita" (Honda et al. 2016, p.26). (Noteworthy to recognize the impact of population size on reported measures.) While incorporating greater controls is an utmost priority, communicating the health problems associated with this practice to unknowing participants, such as women and children, has brought forth the opportunity to innovate to make less harmful component parts in products, provide protective clothing for workers, and introduce safer processing methods that reduce contact with harmful components.

13.2.3 Can What Is Good for the Emerging Goose Also Be Good for the Industrial Gander?

The establishment of the 1997 Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC 2014), now signed by just over 190 countries minus the US, deemphasizes emissions regulation from newly industrializing nations such as China, India, and Brazil. "Reflecting their circumstances, the focus of low-income countries is on climate resilience rather than emissions" (Nachmany et al. 2017, p.5).

Climate resilience is the process of developing sustainable options in response to environmental stressors intensified by climate change (e.g., limited freshwater supply coupled with drought) while emissions regulation seeks to reduce the number of hazardous contaminants into the environment. But development that contributes to the growing burden of environmental and public health decay appears in stark contrast to the true objective of climate resilience. Today, Chinese citizens in Beijing wear masks to protect their lungs against particulate matter found in smog that is known to impact cardiac health (Guan et al. 2017). The emphasis on climate resilience versus emissions also represents a significant difference in the development of

regulation, implementation and adherence upon considering the toxic contribution of greenhouse gas emissions from these emerging nations.

There is a small voice battling the emissions exemption to emerging nations established in the Kyoto agreement in contrast to the cry for global solutions rectifying international environmental conditions. A global solution does not appear possible in the face of clear distinctions between monitoring and accountability in industrialized nations compared to emerging nations. The exemption also represents a nearly unrestricted opportunity to build in nations where there is a lack of regulation. The less-developed/emerging nations may be doomed to repeat history and bring the rest of the world with them unless there is an influx of regulatory constraint and a standard of ethical business practice. Further, the implementation of ethical business standards also applies to corporations who have transferred operations from developed nations to emerging and less-developed countries.

However, there is hope for a less dismal future. The OECD foresees linked interdependencies forming mutually beneficial collaborations between developed and emerging nations (OECD 2008b). The basis of which can address resource management, such as projected increases in fossil fuel consumption by emerging nations as they expand their industrial base, social stability, and strategies to halt pandemics and new methods to transfer technology (OECD 2001, 2017b). Nevertheless, merely transferring the point of origin of pollution does not resolve the mounting global impact on the environment and public health. Thus, the social element is important to addressing global environmental problems.

13.3 Key Social Considerations

Various interpretations of the use of the word "social" are expressed in business, economics, life science and psychology. They include extended terminology such as social issues, social environment, and social foundation. Physical and biological environmental assessments, generally headed under social issues, can be found in any example of an environmental impact assessment for proposed development. They can also appear in a critical assessment of income inequality, one element of the social environment, that could have long-term consequences in the structure of representative government—also known as a social foundation. All three "social" perspectives aid in unravelling the complex nature of business development, environmental conditions and their health consequences, income equality and any other shortcomings in the quality of life that limit progression of those with lower socioeconomic status. Thus, this section reviews some of the social issues targeted in environmental impact assessments and the inclusive element of open forums for public review. Then, we view the topic of income inequality in the social environment and the proposition of exclusionary representation in the social foundation of government with competing literature.

13.3.1 Environmental Impact Assessments: Social Issues

Businesses generate new product ideas all the time by perceiving an unmet customer product or service in an existing market or by innovating new product sectors. Product development often requires new manufacturing space that requires land development. When a business or developer requires land, one of the necessary precautions that businesses must undertake in determining if new development is realistic starts with a perceived unmet customer product or service. The term "customer" may change in other arenas but the premise is fundamentally the same. For example, employment growth is linked to regional economic strength and the customers are the constituents of that region. The perceived customer base translates into viable business or policy objectives that often, in turn, require the addition of facilities. The addition of facilities begins with a process of site review and public forums that engage the community. These activities play a significant role in the economic and political feasibility of any new development, program, project, or plan.

A primary tool in this process is the conduct of an environmental impact assessment (EIA). EIA is "the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made" (IAIA 1999). While national strategies can differ slightly in process and agency reporting structure within nations—demonstrated by a cursory comparison of the United Kingdom (UK) Department for Communities and Local Government (2014) (WHO Europe 2013) and between nations, such as the United States and Central American and Dominican Republic Free Trade Agreement (CAFTA-DR) (EPA 2017b), they share fundamental objectives to minimize environmental damage.

Multilevel government monitoring and reporting also play a key role in regional, national, and international objectives. For example, Ireland often derives national legislation from shared European Union Member State policy, such as Directive 2014/52/EU implemented in 2017 (EU 2014), to guide development of national objectives with local planning authorities—the Department of Housing, Planning, Community and Local Government, and community members impacted by new development (IEPA 2017).

In another example, the US EPA provides an Environmental Impact Statement (EIS) database portal that is open for public access (EPA 2017c). Further, the United Nations Environmental Programme (UNEP) offers status briefs and tools relating to sustainability including detailed training information on EIA and global monitoring (UNEP-WCMC 2015; UNEP 2002).

These selected EIA tools and resources provide a framework for capacity building in conjunction with concern for the environment. Together they envelop social issues expressed in EIA facets of collaboration between and among institutions and the public, understanding the dynamic and multitiered legal foundation of sustainability, and reporting elements that aid in decision-making embracing the perspective of various stakeholders.

The social, environmental and potential health hazards for various stakeholders become transparent in the required content of EIA reports. The EIA reporting elements consist of public involvement, screening (a preliminary assessment), and scoping (CEIL 2015). Scoping is a public process that has two primary elements—(1) the systematic identification of major obstacles, potential solutions, and impact of each; and (2) the capacity to categorize important problems that require further resource allocation, staging, and planning (CEIL 2015).

Elements of environmental and public safety, spanning beach erosion to waste management, often dominate an EIA report. Some of the many concerns in new development include local, national and international topics. Some local aspects include the visual and actual impact of the development on the natural landscape/seascape including fauna and flora, the ability to maintain cultural heritage for the indigenous population, and the short-term impact of accommodating construction workers. National concerns may entail the long-term impact of tourism including national security relating to international visitors and the contribution of job growth to economic stability. Of course, any one of these items may crossover into other levels of concern including concern for government stability, leading us to the next section.

13.3.2 Income Inequality in the Social Environment and Social Foundation of Government

Income inequality, defined as the unequal measure of national wealth distributed across existing socioeconomic classes (e.g., rich, middle-class, poor), is a common problem in less-developed, emerging, and industrialized nations. Academia is overflowing with decades of literature informing that the answer to income inequality is sustainable capitalism (Barton 2011; Schweickart 2010), could be sustainable capitalism (Bradford 2000; Lambin 2009; Liodokis 2010), or can't possibly be sustainable capitalism (Cervantes 2013; Leech 2015; Rull 2011). "Sustainable Capitalism is a framework that seeks to maximise long-term economic value creation by reforming markets to address real needs while considering all costs and integrating ESG [environmental, social, and governance] metrics into the decision-making process" (Generation Investment Management LLP 2012, p.4). Sustainable capitalism—logical in theory, but perhaps slow to transition to application in the business world where short-term gain is the normative objective.

Meanwhile, the debate continues through these and many other examples, bringing forth both the benefits of development and the disdain for accompanying problems. At this junction, there emerges a link between income inequality in the social environment and social foundation of government. Two opposing didactic extend the problem of income inequality to unequal government representation. The first entails the prediction of the fall of a democratic society while the opposing view underscores some important information relating to the hotly debated problem.

Sitaraman (2017) describes the intent of balanced representation in the US Constitutional policy as teetering towards the wealthy as income inequality has marginalized the lower socioeconomic class in American society due to lack of representation. He suggests that the decay of the foundations of democracy might be averted if adjustments to class representative government were incorporated into the Constitution now that he surmises the US Constitutional premise of equality is waning. Thus, he points to long-standing government structures, such as the United Kingdom's House of Lords/House of Commons, that continue to balance power between the wealthy and less affluent (Sitaraman 2017). The election of billionaire real estate mogul Donald J. Trump to the White House as the 45th President of the US certainly supports the proposition as plausible to some.

On the other hand, those who do not believe there is a threat to the foundation of democratic society based on the growing gap of income equality are quick to respond. They cite two main opposing arguments: (1) the less than dismal circumstances of America's lower socioeconomic class operating within a capitalistic market and (2) lack of evidence to support skewed representation in favor of the wealthy. Few, however, would refute the value of Sitaraman's (2017) historical review on the evolution of the US political structure or his position that the restoration of a middle class will promote greater social stability. Yet, the opposing perspective brings forth some important information to pause some fear generated by the proposition that income inequality and thus, declining political representation of lower socioeconomic class citizens, is a prelude to government failure.

First, the plight of an impoverished American compared to those with lower socioeconomic status in other countries is decidedly different. This standing may attest to the sustainability of existing democratic representation and capitalistic principles that apply to the entire population. On the other hand, poverty is poverty. The author notes the importance of the personal nature of the problem and recognizes indications that the population concentration of those experiencing poverty may be moving out of urban America and into rural/suburban strongholds (Allard 2017; Mirsa 2017) after years of policy targeting urban poverty.

Nevertheless, analysis of the last US Census in 2010 indicates that while the number of poor are increasing in the US, their capacity to obtain basic needs (e.g., food, housing, and medical care) have not been entirely thwarted. Only a small percentage (4%) experience homelessness for a period while about 6% may have to live in overcrowded housing (Rector and Sheffield 2011, p.2). Home ownership, in some cases due to government incentives, is not out of reach for many American's with low socioeconomic status. Neither are amenities such as vehicles, television sets with access to cable, personal computers with access to the internet, and microwaves. The buying power of Americans with low socioeconomic status does not appear to be as greatly subverted but this does not necessarily indicate that their political influence has not been suppressed.

However, other scholars concur that while income inequality exists, the notion that the problem threatens democracy is unfounded. Recent analysis suggests that the relationship between growing gaps in income inequality do not favor the political influence of the wealthy for at least three prominent reasons. First, no statistical

evidence supports the notion that income inequality threatens democracy; second, evidence does suggest that, in contrast to popular belief, there is a strong correlation of political perspectives across socioeconomic designations; and third, the number of policies that were enacted into law were divided equally even when that policy had opposing positions expressed by constituents in the upper and middle class (York 2017). Even so, "While income alone is not a good predictor of political influence, it is undeniably true that some have greater access to power" proposing that "reformers should address the undue influence of political insiders and root out cronyism instead of focusing on an unrelated phenomenon of income inequality" (York 2017, p.1).

Nonetheless, while the US may not be suffering to the extent of global citizens experiencing low socioeconomic status, there is a worldwide shortfall of components that represent the individual and community needs that act as a social foundation. The social foundation here consists of equitable access to daily needs, political representation, and social equity represented by the availability of healthcare, education, and employment without undue harm to the natural environment (Raworth 2017a). The natural environment, or ecological ceiling, represents various environmental conditions that complicate success at the social foundation. They include contaminants that provoke climate change, ozone layer depletion, and chemical waste destroying water supplies, animal life, and land used to support the food supply (Raworth 2017a, b). Together, this perspective depicts the shortfall in the capacity to achieve the elements of the social foundation as the empty space in the center of a donut. Thus, the phrase "donut economics" (Raworth 2017b) represents the inner radius of the donut with elements of the social foundation that surround the hole while the outer radius of the donut encompasses the ecological ceiling; the space between the inner and outer radius is designated as the safe objective (balancing resource needs and ecological limits). The author argues that this demonstrates a need to generate new economic alternatives proposing a paradigm shift to humanitarian enterprise versus financial incentives, the reallocation of wealth, and incorporating ecosystem sustainability as a key element in economic development (Raworth 2017a).

But is this what the people want? Consider that there is a nation that has a high-rating in several sustainability categories such as government, agriculture, and the environment (Lewis 2015). Access to elements that comprise the social foundation are clear in provisions for healthcare, food, clothing, housing, and equitable government. The country? Cuba! When the notion of a sustainable nation comes to mind, the small island nation south of the Bahamas and the State of Florida on the east coast of the US is hardly the first nation that comes to mind. However, the nation experienced a cultural revolution in 1991 when their primary importer of oil and other goods, the Soviet Union, fell under the weight of Communism. Cubans faced the immediate need to adjust from mechanized farm and other equipment to an agricultural economy due to the shortfalls of fuel, spare parts, and other goods. The transition was supported by the introduction of oxen to work the fields and permaculture (e.g., urban gardens, raised beds, and soil-enriching composting) but took several years before soil composition could produce sufficient quantities of

crops (Alvarez 2012; Quinn 2006) evident in reported weight loss of most Cubans during this time. Fifteen years had passed from the onset of their transition and recognition by the World Wildlife Federation across several as the most sustainable nation in 2006.

Today, Cuba receives slightly more than half of their primary imports of petroleum, food, machinery, and chemical supplies from three nations—China (21.3%), Venezuela (17.7%), and Spain (12.1%) (CIA 2016). But the important takeaway from their sudden supply chain loss was the development of cooperative farming that has now spread to other industries (Alvarez 2012). From their perspective, the cooperative approach may be the continued path to economic stability and sustainability; perhaps the answer to sustainable capitalism in the fight against income inequality. What is clear is that the nation represents an example of what to expect when natural and external resources dry up due to failing political alignments, war, and the natural limit imposed on production due to diminishing supply of raw materials.

13.3.3 Still Havana a Good Time: The Cuban Experience

The Obama Administration in 2016 eased conditions on travel and trade on the more than half-century old US trade embargo to Cuba. The action opened the country to travel bringing insights from American tourists who relay direct observations of the people and the nation. A common theme is the historical charm of vintage automobiles, the prominent sense of equality among the people, and that the basic needs of the people are being equally met by the government. Still, travelers relay how Cubans are fascinated with foreigners and are eager to engage in conversation. Topics vary but some will say that almost all Cubans want to leave but will not discuss specific politics with an outsider. But, there is also a reported sense of "something missing" because of the government role in providing population needs.

> I liken the current Cuban system to placing a tiger and a sloth in separate cages. While the sloth can be comfortable in the confinement of the cage, being well-fed and protected, a tiger requires an outlet for activity. Like the tiger, many Cubans are active, alive with curiosity, ambitious, and seeking an outlet to express their unique gifts," says Brian Gerrits, a Florida small-business owner and inspiring inventor exploring innovation in Cuba in 2016. "My general impression of the people is that there is no incentive to work smarter or otherwise excel because the system offers little to no personal reward as everyone receives the same benefits from the government.

In Cuba, even many skilled craftsmen perform their duties using a limited number of tools and time-consuming manual labor. For instance, an American tourist observed that a construction worker spent 5 days chipping away a layer of material from a cement ceiling. Access to simple tools would have reduced the job time to half a day. When the tourist showed the worker pictures of trade tools, they were unable to recognize some common items (e.g., router, electric plane) because they simply did not have access to them.

Ironically, the lack of modern tools and spare parts is one way for the Cuban people to express some individual creativity. Cubans exhibited their innovation by

utilizing parts from abandoned vehicles, such as old car axles and tires, to make horse-drawn carts. Even common objects, such as a 2-liter Cola bottle and pulleys from old appliances, would be transformed into a makeshift gas tank and drive belt for a small motorcycle. While this type of local innovation provides some creative outlet, a recent tourist explains that most Cuban people would like to be in a system where they are unfettered so that they would have the opportunity to shine.

These observations may demonstrate that while basic needs are being met in the highly touted Cuban sustainable economy, there may be a lack of individual incentive that may be difficult to embrace in nations filled with entrepreneurs and inventors. Thus, any transition to business development modeled on the ecosystem approach, or similar, must incorporate methods for tigers to embrace meaningful activity.

13.4 Moving the Public Towards Civic Engagement

The long-standing and growing number of research touched upon in this section confirms the relationship between air quality and heart disease (Brook et al. 2010; CDC 2016a; Solomon 2011), the built environment and mental health (Srinivasan et al. 2003), the impact of birth outcomes and inflammation (Brook et al. 2010; Solomon 2011) and a wide variety of health problems associated with the environment. The ability to access resources to understand the foundation of policy is important at all levels of government. Thus, this section introduces a variety of references at the national, state, and local level to promote civic engagement.

Multiple federal (https://www.usa.gov/federal-agencies/a) and state agencies in the US were enacted to address a variety of environmental conditions (e.g., behavioral risk factors such as smoking or alcohol abuse, manufacturing emissions and waste, air and water quality, national security, traffic safety) that cumulatively impacts public health. (Table 13.3). These agencies have a common objective to provide a wide variety of services that improve quality of life including (1) identification and monitoring the source of pollutants, (2) promoting safe environments, (3) providing affordable housing, and (4) opportunities for employment. These and other social services can incrementally improve public health outcomes.

Federal and state agencies target specific areas of public administration such as public health, transportation, and others. These agencies and institutions represent an opportunity to voice opinions, gather information, and recognize how environmental conditions are personal to your health and quality of life. For example, databases generated from EPA monitoring, such as the SPECIATE (EPA 2017d), serve as a "repository of volatile organic compounds (VOCs) and particulate matter (PM) specification profiles of air pollution sources (Simon et al. 2010, p.196). Regional and local analysis of the SPECIATE database information can present a specific opportunity to address immediate public health hazards and reduce the long-term implications of mortality and morbidity.

Table 13.3 Sample resource list of multilevel US government agencies

Agency	Mission	URL
Agency for Healthcare Administration (AHCA)	Specialized Florida State Agency created in response to need for oversite on health funding, such as Medicaid, clinical licensing, and others	http://ahca.myflorida.com/Inside_AHCA/index.shtml
Centers for Disease Control and Prevention	National Public Health policy, monitor and address hazards such as diseases, air pollution, local preparedness, national health	www.cdc.gov
Department of the Interior	National Land use; Bureau of Land Management	https://www.blm.gov/
Environmental Protection Agency (EPA)	National Environmental and Public Health policy including National Ambient Air Quality Standards (NAAQS)[a]	www.epa.gov/
State Department of Health	State Health Agencies	https://www.ehdp.com/links/us-shas.htm
State Department of Transportation	State Transportation Agencies; Infrastructure	https://www.fhwa.dot.gov/about/webstate.cfm
Office of Disease Prevention and Health Promotion (ODPHP)	National Public Health; noncommunicable diseases such as HealthyPeople2020 initiatives[b]	https://health.gov/; www.healthpeople.gov

[a]EPA (2012)
[b]ODPHP (2017)

The US Centers for Disease Control and Prevention (CDC) considers the span of hazards, such as the detailed health effects of multiple air pollutants (CDC 2017a), as well as the relevance of local public health preparedness. Their national approach to public health recognizes that "Every response is local" (CDC 2017b, p.12). The CDC's annual report demonstrates how they react to local community problems, such as the ZIKA virus in Florida and water contamination in Flint, Michigan, to halt the spread of disease and to assess/address the damage to public health. Access to interim resources through the CDC's Strategic National Stockpile also acts as a central distribution warehouse to accommodate local populations with medical and physical needs (e.g., food, beds, temporary shelters) during emergency situations (CDC 2017b). The CDC National Center for Environmental Health (CDC 2017c) targets prevention for preventable noninfectious and nonoccupational diseases, engages in laboratory sciences such as biomonitoring and research, and provides environmental toolkits promoting public education on various topics (CDC 2016b).

An agency familiar to most US citizens is the State Department of Health (DOH). The Florida DOH, for example, "works to protect, promote & improve the health of all people in Florida through integrated state, county, & community efforts" (Florida DOH n.d.). In addition to monitoring clinical and other healthcare professional licenses (e.g., audiologist, registered nurse, optician), the agency regulates healthcare facilities (e.g., emergency medical service systems, dental laboratories, and

pharmacies). One agency that is less familiar to the general population is the Agency for Healthcare Administration (AHCA), enacted by Florida Statute, Chapter 20, to monitor state Medicaid funding, generate state health policy, and work with the Florida Center for Health Information and Policy Analysis to secure and share health care data (AHCA 2017).

The impact of the Florida Department of Transportation (FDOT 2017) is prominent in the development of an interconnected and safe transportation system for citizens and tourists in the state. FDOT addresses various problems by meeting the needs of a variety of modes of transportation including people who drive automobiles on interstate highways, depart on cruise ships from various ports, bicycle along park or roadway paths, walk across bridges, or arrive by rail or air.

Of course, Florida and other states have many agencies with a variety of enacted duties that describe their area of responsibility through state legislation. The Official Portal of the State of Florida demonstrates the wide span of agencies including education, juvenile justice, fish and wildlife conservation (State of Florida 2017). Additionally, this list provides multilevel state information (e.g., county, region) about specialized committees, water management districts, and regional planning councils to allow each citizen to increase their awareness of local problems and engage in decision-making.

The element that all agencies share is a public notification system to invite stakeholders to participate in the decision-making process before new development is approved. While some provide posted agendas and a board meeting calendar, others offer the opportunity to receive announcements, newsletters and to sign up to receive digital news feeds directly to email or through text messaging via cell phone. Often the topics involve results from various reports, such as environmental impact assessments (EIA), and proposed plans that require the attention of those in the community who may be affected by changes.

There are also many national, nonprofit organizations that offer a repository of environmental knowledge. For example, National Council for Science and the Environment (NCSE) (https://www.ncseglobal.org/) advocates scientifically-based empirical research to inform environmental decision-making for the public, educators and international policymakers. Others, such as the Association of State and Territorial Health Officials (ASTHO 2017), provide leaders of public health agencies (e.g., state, territorial) with legal interpretation of multilevel government compliance legislation that impact their decisions for developers, planners, and other regulators.

Together, this small sampling of multilevel government agencies and nonprofits represents multiple institutions and public policies whose mission is to positively impact environmental and public health. They provide an opportunity for each citizen to engage in public discourse, generate awareness through education, provide tools and resources to address a variety of concerns and emergency situations, and establish data and other information to assist in the policy decision-making process.

13.5 Discussion

Literature is streaming with multiple suggestions for national governments and now large businesses to act in the fight against hunger, environmental destruction, and other worthy causes. But the average citizen may seem out of touch from this directive, or worse, feel unaffected because they are not aware of the impact of their own personal consumption choices and lack of civic engagement contributing to legacy decisions and policy leading to climate change and poor public health.

The impact of international changes in environmental conditions and their personal health consequences are a major incentive to engage in opportunities for public discourse on development and other problems, such as unemployment or healthcare, that impact the quality of life. Citizens have a place at the table to participate in EIA through publicly held meetings. But they must take the first step by being willing to reach out to obtain informative resources, increase community awareness, and make a personal commitment to engage in the decision-making process. Through nonhostile active engagement, informed citizens may begin to find the chasm between attaining income equality and protecting natural resources narrowing as stakeholders take the opportunity to introduce safer alternatives with new innovations. This inclusive process will also strengthen governance as input is obtained from a larger representation of the citizen demographic securing public health and representative government.

Remember that each of us are part of a business, nation, and ultimately a global representative, who are being called to action. The international changes in environmental conditions and the decisions that permitted them are also personal because they are affecting your health. It is not someone else's problem, it is everyone's problem to solve. Take a moment to ask the questions, "How much do I contribute to environmental decay," and "What can I do to make this world a better place?" The first step is to conduct a personal account of your individual ecological footprint (Global Footprint Network 2017b).

Contributing to a public meeting may be a scary place to start. If the thought of public speaking is too much for your personality, then start out small. Use internet search engines to find ways you can easily save the planet through tips designed to help the environment. Leave small sections of your landscape natural to attract bees and other insects that are valuable to the ecosystem (Fig. 13.1). Or you can bring the outdoors inside and improve your indoor air quality with several plants that improve respiratory health (Clean Air Gardening 2017) by filtering contaminants such as benzene, trichloroethylene, and formaldehyde.

The legacy of e-waste is one area in which individuals can become more cognizant of their habits in consumer spending, recycling, and charitable donations. But improving recycling should not stop with electronics. Many other items, such as construction material and landscaping waste, often end up in the local landfill. Instead, get creative. Broken sidewalk pavers can become a new rock garden to stabilize soil and permit healthy saturation (Fig. 13.2). Composting yard waste can restore the soil vitality of any area by introducing worm activity and even prepare a

Fig. 13.1 Incorporating landscape features such as stones for natural pathways and oasis, maintaining pockets of natural flora landscapes to attract bees and other useful insects and reusing downed tree limbs for edging conserve resources and promote a strong ecosystem (photo on *left* taken by Beth Ann Fiedler; photos on *right* courtesy of James Barr and Cynthia Sweet-Barr, used by permission)

portion of your backyard for planting fresh herbs and vegetables. Those old pair of jeans can be donated or transformed into the material for a "new" apron (Tamz-Nan Creations) or your favorite t-shirts into a memory quilt (Fig. 13.3). Think before you purchase. Get creative before you toss. Preserve or reintroduce natural flora. Plan outdoor activities including planting fresh produce in your own back yard.

13.6 Summary

This chapter provides an overview of the impact of environmental conditions on public health discussing two primary risk factors, age and socioeconomic status, and the leading environmental causes of death. But more importantly, the chapter brings forth the need for an individual response to global concerns through civic engagement, by changing harmful behavior patterns, and bringing a little nature

Fig. 13.2 Repurposing broken and intact concrete pavers to create a whimsical rock garden to contain soil for drought-resistant plants is one way to abate weed growth under shrubs, conserve water, keep soil from eroding, and reduce the number of reusable items heading to landfills (photos by Beth Ann Fiedler)

back into the world one person at a time. We show how economic barriers limit the capacity to overcome the negative impact of poverty on public health but also the devastation of ecosystems in developed nations. The introduction of manufacturing facilities in nations with less rigid or absent regulatory systems tarnishing new ecosystems around the globe is not the answer. Global objectives and international collaboration represent an opportunity to address the ills of the past and prevent future harm. But these objectives can only be achieved through active participation in environmental impact assessments as well as the concern for income inequality. Opposing positions were presented on the problem of income inequality and the potential for those with low socioeconomic status to lack government representation as a prelude to decay of the foundation of US government. Others suggest that alternative paradigms could be developed to meet basic needs while protecting the ecosystem. The chapter also considers that those who advocate an ecosystem economy should avoid patterns established in nations who currently demonstrate high levels of sustainability but limit opportunity. Finally, the chapter provides some points of contact to national, state, and local agencies to facilitate civic engagement and encourages personal commitments to what has been previously considered a problem of big business and powerful governments.

Fig. 13.3 Sandra Pratt transformed Joanie Feledy's favorite t-shirt collection into a custom quilt (clockwise from *top left*) (photo courtesy of Curt Pratt, used by permission); Nancy Stein's granddaughter Tamzin models her upcycled denim kids' apron—complete with front pocket and back bow tie, and Nathan models baby Bandanna bibs from Tamz-Nan creations on Facebook) (photos courtesy of Nancy Stein, used by permission); Margie Lozada demonstrates how a repurposed cigar box and denim pant leg can become a unique purse and beach bag while bottles get new life as a stunning table decoration and special occasion keepsake (photos courtesy of Margie Lozada, used by permission)

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Glossary

Benzene Organic compound generated naturally in crude oil, volcanic eruption, and forest fires but used as an additive to produce industrial lubricants, detergents, rubber, plastics, nylon, and pesticides.

Built environment **S**urrounding features, such as buildings or bridges, that human beings construct.

Capitalism A system of politics and economic development where private versus government ownership of business entities control industry motivated by profit or return on investments.

Climate resilience The process of developing sustainable options in response to environmental stressors intensified by climate change (e.g., limited freshwater supply coupled with drought).

Clinical protocols A treatment regimen for disease management developed in response to evidence-based standards and peer consensus otherwise identified as best practices.

Economic Problem The difficulty in balancing population needs that consume national resources against the reality of limited resources.

Effluents Liquid form of emission waste derived from industrial processing of materials.

Emissions Waste derived from industrial processing of materials into the environment in the form of gas (i.e., carbon emissions) or solids (i.e., lead, particulate matter).

Environmental impact assessment (EIA) Analysis that determines economic, environmental, and political feasibility of projects prior to development to minimize environmental impact.

Feasibility The likelihood of a plan or project to achieve success.

Formaldehyde Strong-smelling gas used in constructing walls and furniture appearing in glue, insulation, and particle board; appear in some personal hygiene products such as soap, toothpaste, and cosmetics labeled are urea, methanol, and others.

Income inequality An unequal distribution of national wealth that sharply divides members of that economy by their status as rich or poor; a measure of the unequal wealth distribution generating a widening gap or indicating a hole in reported individual income where socioeconomic classes are concentrated at the high end for relatively few and low for an increasing number of people.

Infrastructure Infrastructure is the interconnected system of the physical, natural, and social components that societies need to survive and function (NSCE 2017).

Ischemic heart disease The most common of several cardiovascular diseases resulting in damage or disease to the coronary arteries (major vessels supplying the heart with blood, nutrients, and oxygen).

Natural/physical environment Natural features of the geographical surroundings such as mountains, lakes, and plants; natural landscape.

Particulate matter Small, harmful airborne particles (e.g., lead, aerosols) suspended in the atmosphere that impact climate and human health.

Persistent Organic Pollutants (POPs) The capacity of certain chemicals to travel over long distances.

Polychlorinated biphenyls (PCBs) An example of a persistent industrial use organic pollutant that causes environmental harm at locations beyond the area of original use.

Social environment Personal impact of cultural influence, level of institutional development, and physical location influencing the capacity to interact with others.

Social foundation Various interpretations including a list of basic needs found in access to such items as water, nutrition, and healthcare but inclusive of human rights such as fair political representation and equitable governance.

Systolic blood pressure The peak pressure occurring at the end of the cardiac cycle when the ventricles (pumping chambers of the heart) contract, reported as the first number; whereas diastolic in the second and minimum number reported, measures the beginning of the cardiac cycle when the ventricles fill with blood.

Trichloroethylene Clear, flammable industrial solvent toxic to nervous system and normally found in aerosol form used as a degreaser in cleaning products for cars or dry cleaning for clothing.

Volatile organic compounds (VOCs) Organic chemicals normally produced consequently to industrial processing (e.g., solvents) generating emissions harmful to human health.

Vulnerable Can refer to a specific population identified by certain characteristics (i.e., low income, ethnic, female) that place them at greater risk of poor health; populations that are exposed to the conditions of climate change with limitations on their capacity to adapt.

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