# 2 Standing Silos: Public Health and Environmental Management

The connections between environment and public health have been recognized for thousands of years. Indeed, most current policies for protecting the environment evolved from concerns about human health in crowded urban environments. Every year, new research provides additional evidence that environmental degradation, exposure to toxic chemicals, and cumulative neighborhood stressors are harming people's health—particularly in low-income neighborhoods, urban areas and communities of color. The short answer to why we are not doing a better job of creating environmentally healthy communities is that there are gaps in existing systems for managing the environment. As described in chapter 1, these systems include environmental and public health laws, agencies at every level of government, and private businesses, community groups, and nongovernmental organizations. Existing management systems do not effectively account for cumulative, concentrated, or interactive effects at the local level. Public health and environmental management agencies operate under different policy mandates, regulations, funding streams, and levels of government. Siloed approaches to management of different sectors pose barriers to resolving these problems. Community-based solutions have the potential to fill these gaps by linking environment, public health, and equity concerns at the local level. Connecting environmental and public health decisions makes sense, but doing so is challenging because of disciplinary, funding, institutional, policy-making, and scientific barriers.

Throughout the country, community groups, researchers, government officials, and health professionals are working at the local level to shape environmental decisions in ways that better protect public health and promote environmental justice. These collaborations often take place outside existing institutions. Because they are initiated in response to locally

identified problems, their collaborative structures, objectives, and activities are extremely diverse. Innovative local efforts have emerged to address the community health impacts of industrial air emissions, port and vehicular traffic, water contamination, the walkability of neighborhoods, ambient noise, consumption of contaminated fish, energy development, and legacy pollution from toxic waste, among many other issues. However, these local efforts are generally isolated and have not been systematically analyzed, evaluated, or disseminated to other communities.

To address problems of environmental health equity at the local level, it is necessary to understand the existing system for protecting public health from environmental harms, how it evolved, and what gaps allow some communities to continue to be disproportionately exposed. This chapter presents a brief history of the field of public health as it relates to environmental factors, tracing how environmental management functions were separated from public health protection over time, creating gaps in management that continue to create localized problems. The structure of the current U.S. environmental protection system is discussed, focusing on the relationships between local, state, and federal entities. Although a comprehensive overview of U.S. environmental policy is beyond the scope of this book, it is useful to highlight here those aspects that are most relevant to understanding the urban environmental health issues explored in the case studies. The specific policies related to each initiative are presented in greater detail in the case chapters.

## Public Health and the Environment

The evolution of environmental and public health protection systems in the United States has shaped the current legal context, perspectives of diverse stakeholders, and roles of various government entities. This brief overview of the historical relationship between public health and environmental management contextualizes the scope and limitations of public health agencies' involvement in local environmental health problems.

### Defining Public Health

Most people think of "public health" as describing the health status of a population, but the term also refers to society's efforts to protect the public's well-being. In 1920, Winslow defined public health as the "science and

**Box 2.1**
Defining Public Health

The Institute of Medicine's Committee for the Study of the Future of Public Health defined public health as having three elements (Institute of Medicine 1988):

- *The mission of public health*: the fulfillment of society's interest in ensuring the conditions in which people can be healthy.
- *The substance of public health*: organized community efforts aimed at the prevention of disease and promotion of health. It links many disciplines and rests on the scientific core of epidemiology.
- *The organizational framework of public health*: encompasses both activities undertaken within the formal structure of government and the associated efforts of private and voluntary organizations and individuals.

art of preventing disease, prolonging life, and promoting physical health and efficiency through organized community efforts. …"(Winslow [1923] 1984, 30). More recent definitions of public health (see box 2.1, *Defining Public Health*) similarly encompass process, policy, practice, and outcomes related to the public's well-being (Patel and Rushefsky 2005; Dannenberg, Frumkin, and Jackson 2011).[1] Thus, public health includes not only public sector efforts but also organized community initiatives, public interest groups, and private institutions (hospitals, private businesses, etc.).

The conceptualization of public health as a multidisciplinary, applied field of practice with the goal of promoting the public good was embodied in the seminal 1988 report, *The Future of Public Health* (Institute of Medicine 1988). According to this report, government should support three "core functions": (1) assessment (monitoring of the population's health status, analyzing emerging problems, and evaluating outcomes); (2) policy development (working with stakeholders to make policy and resource allocation decisions); and (3) assurance (implementing policies, providing services, and promoting private-sector action). Public health is concerned with trends and conditions that negatively affect a community's current or future health and well-being. Thus, the focus of public health evolves as the types of problems dominating people's health concerns shift over time.

The government role in public health includes but is not limited to the work of federal, state, and local health departments. Because the U.S.

Constitution leaves the fundamental responsibility for protection of the public health to the states, most public health efforts are organized at the state or local level (Schneider 2016). At the federal level, the Centers for Disease Control and Prevention (CDC), the National Institutes of Health, and the Food and Drug Administration play important roles in researching, funding, and tracking public health (Schneider 2016). In addition, many non-health agencies ranging from agriculture to transportation are involved in managing environmental impacts on human health.

### The Common History of Environmental and Public Health Policy

Western understanding of the relationship between health and environmental factors dates back at least 2,000 years to the Hippocratic book on *Airs, Waters, and Places* (Rosen 2015). The concept that environmental forces or "miasmas" affect human health guided early efforts to provide clean air, water, and sanitation services to reduce disease (Andrews 2006; Melosi 2001). Most introductory public health texts highlight the foundational importance of environmental health through the example of John Snow's efforts to address cholera epidemics in London in the 1850s (Rosen 2015; Schneider 2016; Snow 1855). Snow identified that many of those who died from cholera took their water from a single pump that was contaminated by sewage (Rosen 2015). When the pump handle was removed from that well, the rates of cholera plummeted. To this day, the "pump handle" is a common icon for public health (CDC 2004a).

Mortality from cholera and other contagious diseases in cities, health problems from industrial and domestic smoke, and the lack of decent housing for rapidly expanding urban populations gave rise to the sanitary movement, which began in England in the mid-1800s and spread to the United States (Patel and Rushefsky 2005; Melosi 2001; Duffy 1990). Although people did not understand exactly how diseases were transmitted, they made the connection between dirty water, air, or waste and health problems in crowded urban neighborhoods. This observation suggested that environmental controls could reduce disease (Corburn 2009). Thus, the origins of public health practice were grounded in environmental management (Rosen 2015, Melosi 2001).

However, progress in addressing sanitary issues in the United States was limited by a lack of government entities to implement regulations (Patel and Rushefsky 2005; Rosen 2015). Although many large U.S. cities had


**Figure 2.1**
"Death's Dispensary": 1866 cartoon linking cholera and contaminated water pumps. Source: George John Pinwell illustration, *Fun*, August 18, 1866.

established Boards of Health by the early 1880s, they lacked the power to control pollution (Duffy 1990; Melosi 1980). "Sanitary surveys" conducted in several cities delineated the burden of disease and premature death from environmental causes in poor neighborhoods. This data helped build support for stronger agencies, laws, and public investments in infrastructure (e.g., sewers and drinking water treatment) and services (e.g., waste collection) (Andrews 2006; Melosi 2001).

By the end of the nineteenth century, medical researchers had established that microbes, not general environmental miasmas, produced infectious disease (Andrews 2006; Rosen 2015). This understanding led to new approaches to preventing outbreaks, such as sterilizing milk, improving cleaning practices, and eliminating pests that could carry disease. Soon after, the growing field of immunology produced the first vaccines for preventing disease. By the early twentieth century, the field of public health had adopted the biomedical model of disease, which led it to a focus on individual-based solutions, including vaccination, medical treatment, and hygiene education rather than environmental or social change (Rosen 2015; Corburn 2002; Andrews 2006).

Urban social reform movements during this period were also key forces in the development of public health in the United States. The vast improvements in overall population health made possible through "bacteriological" interventions placed health disparities into stark relief (Rosen 2015). Social reform movements in the early twentieth century focused on alleviating the many problems of the poor, including ill health (Andrews 2006; Starr 2008). Women's civic organizations played an important role in many of these "municipal housecleaning" efforts (Hoy 1995; Sivulka 1999; Rynbrandt 1999; Melosi 2001). In several cities, progressive reformers like Jane Addams, Alice Hamilton, and Florence Kelly established settlement houses to serve the poor (Corburn 2009). Their efforts to document, address, and advocate for solutions to problems of the urban poor highlighted connections between neighborhood environments, poverty, and public health. Nevertheless, public health continued to move away from such population-based social justice efforts to focus on individual medical approaches.

At the same time, technical agencies and regulatory structures emerged to address environmental issues including air quality, water quality, and housing and neighborhood conditions (Melosi 2001). In the early 1900s, the field of planning developed to promote well-functioning urban

environments through better housing, separating industries from residential areas, and public parks (Corburn 2009; Peterson 2003). Sanitation agencies run by engineers were created to manage drinking water and wastewater treatment to meet health-based standards for quality. By the 1940s, many cities had established agencies to address issues of housing quality, municipal trash collection, school health, and occupational safety (Melosi 2001; Duffy 1990). At the federal level, the U.S. Food and Drug Administration and the Department of Agriculture took on the task of setting standards for food safety, although local health departments continued to play a role in implementing these regulations (Patel and Rushefsky 2005; Andrews 2006).

### The Evolution of Public Health and Health Departments

Cities' efforts to manage environmental sanitation and public health agencies' focus on clinical health services drastically reduced infectious disease during the early twentieth century (Starr 2008; Schneider 2016). As these diseases declined, chronic illnesses like heart disease, cancer, and respiratory disease emerged as the leading causes of death (CDC 2016b). Responsibility for treating these diseases fell on the health care system, which experienced rapid growth over the same time period (Starr 2008).

The role of public health agencies diminished as the health care system assumed responsibility for treating chronic disease. By the 1980s, the public health system was viewed as underfunded and ineffective (Walker 1989). The Institute of Medicine (1988) report on *The Future of Public Health* was written to inform efforts to better define, resource, and organize the field of public health. Although this framework offered general guidelines for what the public health system should do, implementation of these services was uneven and differed from place to place (Public Health Law Center 2015; NACCHO 2005).

Today, most states have a central Department of Health that oversees these core public health functions in partnership with health care providers and local health departments. The structure, authority, and responsibilities of local health departments varies by state (Association of State and Territorial Health Officials 2018; Schneider 2016). In "home rule" states, local government has more power, which can mean greater authority for local health departments (Dannenberg, Frumkin, and Jackson 2011). Many large cities have their own health departments; in other areas, public health efforts are organized at the county or regional level. Most local health departments

provide some clinical preventive services, health care services (e.g., treatment for communicable disease, home visits, maternal or child health clinics for low-income residents), prevention education, and surveillance of health conditions (Salinsky 2010). They may partner with other entities to provide some of these services (Association of State and Territorial Health Officials 2018). The structure, staffing, and function of health departments has changed over time as new health challenges emerge and budget priorities shift (Madamala et al. 2011). For example, after the terrorist attacks of September 2001, infusions of federal funding significantly expanded health departments' emergency preparedness programs while resources for other programs dwindled (Schneider 2016). Overall public health funding further declined after the recession of 2008 (Mays and Hogg 2015).

Most health departments have an environmental health division that focuses on sanitary inspections, rabies control, pest management, and monitoring environmental quality (e.g., lead exposure, sanitation, water quality, waste sites) (NACCHO 2015). The Centers for Disease Control and Prevention (CDC) developed ambitious "Environmental Health Performance Standards" to encourage more comprehensive programs, but many local health departments (especially in smaller cities and rural areas) lack the funding, technical capacity, or legal mandates to carry out these functions (CDC 2014a, 2016a). Nationwide, local health departments' staff capacity in environmental health shrank from 15,300 in 2008 to 13,000 in 2016 (NACCHO 2016). The technical focus of many local environmental health departments means that staff may have little training or experience in the broader environmental determinants of public health such as built environment, food access, and housing quality, policy work, or community partnerships (McGinty, Castrucci, and Rios 2018). Thus, in the context of health departments, "environmental health" usually refers to core functions like monitoring and sanitary inspections (National Environmental Health Association 2018). Outside of health department contexts, however, the definition of "environmental health" varies greatly (See box 2.2, *Defining Environmental Health*). In this book, the term "environmental health" is used to refer broadly to public health problems in which characteristics of the natural, physical, or built environment play an important role.

This broad definition of environmental health is inherent in Healthy People 2020, a set of goals and objectives issued by the U.S. Department of Health and Human Services to guide health promotion and disease

**Box 2.2**
Defining Environmental Health

Different organizations, disciplines, and sectors define the term "environmental health" differently. "Environmental health research" commonly refers to toxicology, which is the study of how chemical contaminants affect the body. However, the National Institute of Environmental Health Sciences (NIEHS) has a broader definition; its mission is "to discover how the environment affects people in order to promote healthier lives" (NIEHS 2012a, 1). In other settings, "environmental health" or "healthy environments" may refer to the health of ecosystems or the nonhuman environment. The field of "One Health" focuses on the relationships between healthy ecosystems and human health (CDC 2018c). Local planners and community stakeholders often use the term "environmental health" to refer to characteristics of the built environment, like walkability, transportation safety, or even exposure to secondhand smoke. The term "environmental public health" is sometimes used to emphasize community-level concerns about local problems. Local health departments may define "environmental health" in terms of the services they provide, such as sanitation inspections, lead poisoning prevention, food safety, and vector-borne disease. The World Health Organization's 2016 report, *Preventing Disease through Healthy Environments* takes a broad view of "environmental risks to health" as including "all the physical, chemical, and biological factors external to a person, and all related behaviors, but excluding those natural environments that cannot reasonably be modified" (Prüss-Ustün et al. 2016, x). Given these diverse interpretations, it is important to be clear what is meant by "environmental health" in a particular situation, especially as it relates to the role of public health agencies.

prevention efforts. The environmental health section within these guidelines addresses six themes: outdoor air quality, surface and ground water quality, toxic substances and hazardous wastes, homes and communities, infrastructure and surveillance, and global environmental health (Office of Disease Prevention and Health Promotion 2018a). Many of the levers for managing such environmental health determinants lie outside the authority, responsibility, or capacity of local health departments. Thus, although public health agencies play an important role, environmental management is largely the responsibility of multiple agencies. Awareness of these relationships is key to understanding the kinds of partnerships required to address local environmental health problems.

## Environmental Management: From Local to Federal

As described thus far, the U.S. environmental management system largely developed in response to concerns about human health and well-being. Problems with air and water quality in urban areas spurred the earliest public health efforts. Regulation of industrial chemicals, hazardous waste cleanup programs, and occupational health protections all aim to manage human exposures to environmental toxicants. The objective of most natural resource, public lands, and wildlife decisions is to manage human use and distribution of the resulting economic benefits (e.g., jobs for natural resource dependent communities; mining, grazing, and forestry uses; and the recreational use of public lands). Nonetheless, issues related to natural resources management, such as smoke from wildfires, water contamination from mine tailings, and opportunities for physical exercise, have significant implications for human health.

Most federal laws that guide environmental protection today were passed in the 1970s in response to growing public awareness of the ecologic, economic, and human health costs of environmental degradation. Environmental problems became more visible in the 1950s and 1960s, with thousands of deaths attributed to poor air quality events, the loss of biodiversity resulting from the widespread use of DDT and other pesticides, "dead" lakes, and rivers literally catching on fire (Andrews 2006). Growing concern about the environment prompted the first Earth Day in 1970. Public pressure led to a wave of federal responses including the National Environmental Policy Act of 1969, the Clean Air Act Amendments of 1970, and the Clean Water Act of 1972) (Salzman and Thompson 2014). Additional policies addressing pesticides, drinking water protection, and hazardous waste management, disposal, and cleanup followed shortly thereafter. Created in 1970, the U.S. Environmental Protection Agency (EPA) was given responsibility to implement many of these laws (Williams 1993; U.S. EPA 2018c; Andrews 2006).

A comprehensive overview of the U.S. environmental policy system is beyond the scope of this book. However, as a foundation for appreciating the significance of local environmental health initiatives, it is important to understand the general structure of the federal environmental management system. The common theme of "silos"—the separation of management of different sectors and aspects of environmental quality—and the division of

roles and responsibilities between different levels of government often present barriers to addressing community environmental health concerns. The remainder of this chapter provides a foundation for understanding these and other challenges inherent in the U.S. environmental management system. First, the historical evolution of surface water quality protection in the United States is summarized to demonstrate some of the common features of the U.S. environmental management system. Second, a short summary of the National Environmental Policy Act (NEPA) highlights its function as the main federal tool for integrating environmental regulation of major developments, as well as its limitations. Third, the federal approach to promoting environmental justice—based on President Clinton's Executive Order 12898 of 1994—is briefly discussed.

The fourth section traces the evolution of tools for shaping private land use decisions that have significant implications for community health. Decisions about private land use are primarily under local control but are shaped by national policies, programs, and funding. Gaps in existing environmental management systems can contribute to environmental health disparities or make it difficult to address them. Because of these limitations of the existing policy system, local environmental health initiatives often require working outside established environmental management or public health institutions.

## The U.S. Environmental Management System: The Example of Surface Water Quality

The U.S. environmental management system is stratified by a complex web of relationships between federal, state, and local government entities. A brief look at the evolution, structure, and characteristics of U.S. surface water quality management follows. This overview demonstrates how this system can leave gaps in protection of environmental public health at the local level.

When people began congregating in cities, discharge of human sewage and industrial waste into rivers and lakes contributed to spread of disease (Melosi 1980, 2001). Surface water bodies such as lakes and rivers were used both for water supply and waste disposal. If upstream industries contaminated a river, downstream cities might not be able to use it as a source of drinking water. This presented obvious limitations to individual communities' ability to protect water quality (Andrews 2006). Because of these

problems, some of the earliest state environmental laws addressed water quality, primarily by restricting discharge of sewage or industrial wastes (Kneese and Schultze 1975; Patrick et al. 1992).

By the 1930s, most states had water quality control regulations, but they were generally voluntary or weakly enforced. States that strongly regulated pollution risked losing industry and economic development to areas with less costly requirements (Melosi 1980). This created a strong incentive for states to implement minimally restrictive standards. State-level agencies often lacked the technical resources to develop, enforce, and monitor standards. Additionally, rivers and lakes often cross state boundaries and state-based systems failed to protect these interstate waterways.

The first significant federal effort to create a national system for water quality protection was the 1965 Water Quality Act (Andrews 2006). This law placed primary responsibility for implementation on the states. Lacking a strong system for federal enforcement, technical support, and oversight, the law had limited effect (Salzman and Thompson 2014). When the Cuyahoga River caught on fire in June 1969, it became the symbol of a failed system to protect water quality (Rotman 2017; Stradling and Stradling 2008; Salzman and Thompson 2014). Media coverage of this event galvanized public and political pressure to improve water quality protection. Soon after, with the formation of the EPA in 1970, Congress set about developing a more robust system to protect surface water quality.

The modern system of surface water quality protection is based on the Clean Water Act of 1972 (Andrews 2006; Milazzo 2006).[2] As with most federal environmental laws, the system established by the Clean Water Act (CWA) set national standards, monitoring systems, and enforcement protocols and delegated implementation to state environmental agencies. The CWA set the lofty goal that all surface waters should be "fishable and swimmable" by 1983 (Andrews 2006). The CWA had two major approaches to protect water quality. First, it regulated discharges from new and existing point sources into waterways. Each point source (e.g., industry, wastewater treatment plant) was required to obtain a permit specifying what it was allowed to discharge (Salzman and Thompson 2014). Second, the CWA set standards for surface water quality based on designations for the desired use of different water bodies (e.g., fishing, swimming, agriculture). These standards were informed by public health and ecological research. The CWA also included a massive federal investment in wastewater treatment plant improvements (Andrews 2006).

Despite the significant improvements in surface water quality achieved under the Clean Water Act, many waterbodies still do not meet water quality standards. A 2013 assessment by the EPA found that over half of streams and rivers were in "poor condition," and a significant portion of lakes, ponds, estuaries, and bays were categorized as "impaired" (Salzman and Thompson 2014; U.S. EPA 2013b). These continued problems reflect several gaps in the existing water quality protection system.

First, although the CWA's initial focus on point sources like industries and wastewater treatment plants resulted in significant improvements, pollution from "non-point" sources (e.g., runoff from residential developments, streets, and agriculture) was not effectively controlled. The cumulative effects of non-point pollution within watersheds continued to degrade water quality. Over time, the CWA was amended to better address non-point sources, but they remained problematic (Salzman and Thompson 2014; Viessman 1990).

Second, although surface water quality has implications for public health, public health agencies do not have a direct role in surface water quality protection. For example, local health departments are typically responsible for closing beaches to water-based recreation when bacteria levels get too high. However, they are not typically responsible for setting the standards and making permit decisions that control discharges to surface waters—this falls to state environmental agencies.

Third, water quality agencies do not directly control all sources of pollution. How land is used significantly affects the amount and type of pollution that runs off into waterbodies. Since land use is largely determined by local government and private owners, these sources are difficult for federal or state agencies to control. As well, deposition of nutrients from the air can contribute to water pollution, but water quality agencies do not have direct authority to control air emissions (Salzman and Thompson 2014).

Finally, although state agencies solicit public input in designating "use" classifications of waterbodies, classifications may not reflect actual use. For example, people may fish, swim, or boat in waters that are not designated for these uses. Low-income, non-English-speaking, and recent immigrant populations are at greatest risk because of traditional practices, reliance on subsistence fishing, or lack of knowledge about hazards. Because water quality is monitored by measuring concentrations of certain pollutants rather than actual human health impacts, it is difficult to know how effectively the system of water quality protection actually protects public health

(Iannantuono and Eyles 2000). As Salzman and Thompson note (2014, 188), "Rather than studying the effects of pollution on water quality and human and aquatic health, EPA officials have more often focused their attention on engineering questions."

This brief overview of the U.S. water quality management system shows the complex roles of different levels of government and interactions between health and environmental stakeholders. Several key themes inherent in our framework for water quality protection pertain to other environmental management arenas as well. Many environmental quality issues are managed under similar systems of standards set by federal regulation with clearly specified implementing roles for state and local agencies (one exception is land use). Although these systems aim to protect public health, health stakeholders have limited input. Additionally, there are few tools for addressing the cumulative impacts of pollution from multiple media, sectors, or activities. The legacy of this system has left gaps in protecting environmental quality at the local level.

### The National Environmental Policy Act of 1969

The separate silos of environmental management pose problems for protecting communities' health. The National Environmental Policy Act (NEPA) of 1969 is the federal government's main strategy to promote comprehensive consideration of impacts of all federal actions, including permits, policies, and projects funded by non-environmental agencies (Carruth and Goldstein 2014; Andrews 2006; U.S. EPA 2018f). NEPA's primary tool is the environmental impact statement (EIS) process, in which the agency proposing the action must analyze its potential environmental effects. Although NEPA itself is a short law, its implementation is complex (Eccleston 2008; Andrews 1976; Clark and Canter 1997). There are several key features and limitations of NEPA as they pertain to local environmental health issues.

First, it is important to understand the limits of NEPA's scope. NEPA applies only to major federal actions. These actions include projects conducted by federal agencies (e.g., building roads, dams, or bridges), private actions that require certain federal permits, and projects funded by federal agencies (Carruth and Goldstein 2014; Andrews 2006). The first step of the NEPA process is to determine whether the action is likely to have "significant" environmental impacts. The initial environmental assessment is usually conducted by the agency or industry proposing the action and

provides an opportunity for public comment. If the originating agency or EPA reviews the Environmental Assessment and finds there is no significant impact, no further action is required. Otherwise, the agency proposing the action must produce a full EIS (Clark and Canter 1997).

Thus, NEPA is a process rather than a source of enforceable regulations like the Clean Water Act. There are clear procedural standards for conducting an EIS, including evaluating multiple alternatives to the proposed action, consideration of a wide range of environmental impacts, and opportunities for public input. Although NEPA reviews nominally include human health, the health parameters evaluated are often restricted to toxic exposures (Bhatia and Wernham 2008; Steinemann 2000). It is also important to recognize that while the lead agency is required to respond to all comments received, it is not required to select the least environmentally damaging alternative. Litigation is a common part of NEPA actions: if stakeholders are not satisfied with the EIS, they can sue on the basis that the proper process was not followed or that scientific information was ignored, but not based on the outcome of the decision (Carruth and Goldstein 2014; Clark and Canter 1997).

Effective participation in the review and comment process of NEPA requires significant technical, financial, and organizational capacity. Local stakeholders are typically less able than industry and larger organizations to critique highly technical documents, provide substantive analyses, and draft detailed comments within the time frames allowed. Legal action is expensive and time-consuming. Thus, although NEPA provides for public comment, local communities with limited resources may not be able to participate effectively.

Although NEPA applies only to federal actions, many states have a similar process that applies to state actions (Council on Environmental Quality 2018). These laws differ from state to state, but similar to NEPA, most of them provide opportunities for public comment as part of a nonbinding review process (Bhatia and Wernham 2008). These processes provide an important opportunity for stakeholders to get information about proposed actions, submit new information, and consider alternatives (Andrews 2006). However, NEPA is a limited tool—it applies to a subset of public decisions, addresses a narrow set of impacts, can be daunting to community groups, and does not require implementation of the least-damaging alternative. NEPA is a reactive process: an EIS is conducted on a specific

proposed action. Public comments must respond to the proposal and alternatives put forward by the initiating agency, rather than suggesting new possibilities. NEPA is not a framework for comprehensively considering how future development trends may affect environmental health and equity. Although it offers an important tool for communities concerned about local environmental health problems, NEPA alone cannot address longstanding environmental health inequities in a comprehensive, sustainable, cumulative way.

### Governmental Approaches to Environmental Justice

The environmental justice movement arose in response to the disproportionate burden of environmental hazards on low-income neighborhoods and communities of color. These disparities persisted despite the implementation of federal and state environmental laws enacted in the 1970s and 1980s. To address these concerns, in 1994 President Clinton signed Executive Order 12898 ("Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations"), which requires federal agencies to consider the equity impacts of their actions (Presidential Documents 1994; U.S. EPA 2016e). This executive order instructed agencies to build environmental justice into their work and to "identify and address the disproportionately high and adverse human health or environmental effects of their actions on minority and low-income populations" (U.S. EPA 2016e). While not legally binding, this executive order is supported through several mechanisms, including an Office of Environmental Justice within the EPA's Office of Enforcement and Compliance Assurance (OECA), an Environmental Justice Intergovernmental Working Group (EJ IWG) with representatives from eleven agencies, and a National Environmental Justice Advisory Council composed of nongovernmental and community stakeholders (U.S. EPA 2016a). These groups have developed resources, provided advice, and encouraged agencies to integrate communities' environmental justice concerns in their policies, programs, and funding (U.S. EPA 2016e). For example, the Environmental Justice Intergovernmental Working Group developed guidelines for consideration of environmental justice in NEPA reviews (U.S. EPA 2017b; Federal Interagency Working Group on Environmental Justice and NEPA Committee 2016). The Office of Environmental Justice operates several grant programs to support local environmental justice efforts (U.S. EPA 2017c, 2018b). Public participation and

direct involvement by affected communities is a key aspect of these efforts (Federal Interagency Working Group on Environmental Justice and NEPA Committee 2016).

Several states mirror the approach of Executive Order 12898. California has adopted a goal of "fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies" (State of California Department of Justice 2017a). California's online "CalEnviroScreen" is an open-access mapping tool that identifies communities disproportionally burdened by multiple sources of pollution and socioeconomic factors, like unemployment and poverty, that have been found to increase sensitivity of populations to pollution exposure (Office of Environmental Health and Hazard Assessment 2018). Communities identified as disadvantaged are designated to receive a significant portion of funds generated by the state's cap and trade program (State of California Department of Justice 2017a; Richard 2017). SB 535 (2012) directs that 25 percent of the proceeds from the cap and trade program provide benefit to disadvantaged communities, as identified by CalEnviroScreen. In 2012, Attorney General Kamala Harris issued guidance on advancing environmental justice within existing legal frameworks, particularly the California Environmental Quality Act (CEQA), the state's analog to NEPA (Harris 2012).

Several other states also promote environmental justice through small grant programs, mapping, and other resources (New York State Department of Environmental Conservation 2018; Massachusetts Department of Environmental Conservation 2018). Some of these efforts provide technical and financial resources to local groups to address environmental justice concerns. They may also encourage governmental actions such as prioritizing improvement projects for federal funding that are located in disproportionately burdened communities. However, few localities have adopted systematic efforts to promote environmental justice throughout their decisions, funding, and operations. As described in chapter 3, the movement to comprehensively promote health equity in all policies aims to provide such a framework.

### Urban Land Use and Public Health

Many environmental justice issues arise because of the concentration of hazardous land uses and lack of health-supportive resources near low-income neighborhoods and communities of color. These common geographical

patterns in cities reflect historical, political, and economic forces (Maantay 2002). Addressing these issues in the future depends on aligning community and local, state, and federal government efforts to influence future land use decisions. Although land use is managed at the local level, it is shaped over time by larger political, social, and economic forces that together determine the distribution of environmental hazards and resources within neighborhoods. Because community geographies are relevant to all three case studies in this book, a brief overview of how land use patterns are shaped over time is called for.

As previously mentioned, federal and state agencies aim to manage environmental impacts of developments by setting health-based standards. However, these federal systems do not directly determine what land gets developed, when, and where. Many powers to regulate land use rest within local jurisdictions, although this balance varies from state to state (Dannenberg, Frumkin, and Jackson 2011).[3] Local land use tools influence the private and public sector decisions that shape urban development over time.

Rapid industrialization and uncontrolled growth of cities in the nineteenth century resulted in overcrowded and dangerous conditions. Systems to control land use were developed in part to address public health concerns arising from industries located adjacent to residences. Before government began to regulate urban land use, the only recourse was for affected private property owners to sue for trespass or nuisance based on pollution, odors, or noise that impaired their ability to enjoy their property (Carruth and Goldstein 2014). This approach was inefficient and insufficient to create a healthy separation of incompatible land uses. The worsening health problems in cities gave rise to the idea of land use planning—setting out the desired layout of a city before problems arose, regulating existing uses, and regulating future development to fit that plan (Corburn 2009). The first land use plans in the United States were adopted in the early twentieth century and were modeled on German and British systems (Corburn 2009; Dannenberg, Frumkin, and Jackson 2011). Over time, cities across the United States developed land use plans and agencies to implement them that operated in isolation from public health institutions. In many cities, these planning tools were used to exclude low-income people and communities of color (Babcock 1966; Wilson, Hutson, and Mujahid 2008). A comprehensive description of how municipal planning for land use, transportation, housing, and economic development interfaced with public health goals

over time is beyond the scope of this chapter; however, a robust literature has grown up around the theme of reconnecting these fields (Dannenberg, Frumkin, and Jackson 2011; Corburn 2009; Kochtitzky et al. 2006).

### Shaping the Future City: Local Management of Land Use

Today, most U.S. cities have planning departments that develop and implement a range of plans, policies, and codes to manage existing and future development. The right of local governments to regulate private behavior in order to protect public welfare allows them to regulate land use, but within certain limitations. Government cannot regulate land in such a way as to restrict all profitable use; this would be considered a violation of the "Takings Clause" of the Fifth Amendment to the U.S. Constitution. However, the power of eminent domain allows governments to take ownership of private property after paying fair market value if there is a compelling public need. While governments can control how public land is used, most urban land is privately owned. The government cannot mandate what is built on private land; it can only incentivize and regulate development (Dannenberg, Frumkin, and Jackson 2011).

Land use regulation is based on "comprehensive plans" (sometimes called "master" or "general" plans) that express a city's vision for the future of their community (Dannenberg, Frumkin, and Jackson 2011). Local governments typically implement comprehensive plans through more detailed land use plans, zoning ordinances, and building codes. Chapter 5 provides additional detail on these tools and approaches.

Although most cities have land use plans and codes, their actual control over land use varies. Cities that are struggling economically often lack resources or political will to regulate new development. Small cities may also have limited staff, financial, or technical capacity to review development plans, inspect new or existing buildings, and enforce codes and may not have updated their comprehensive plans for decades (Bunnell 2002). Others have well-resourced planning departments with the capacity to effectively inform, update, monitor, and implement a comprehensive set of planning tools.

In addition to these legal approaches to shaping private development, cities use a range of financial mechanisms to encourage development consistent with their comprehensive plans. Publicly financed infrastructure can support desired private development. For example, when a city improves

roads, water systems, or sidewalks in an area, it becomes more attractive to private investors. Similarly, public facilities like parks, libraries, and schools can attract new private residential developments.

Local governments' capacity to promote changes in the built environment is key to solving many local environmental health problems, particularly because local stakeholders tend to have more influence with local governments than with state or federal agencies. Nonetheless, changes in land use patterns are typically very slow, especially in economically depressed urban areas. As a practical matter, city planning, zoning, and finance can shape future development over time, but it is usually a gradual evolution from existing geographic patterns.

Historical social, economic, and political forces at every level of government created the inequities observed today in the built environment of many cities. In an effort to counter these existing inequities, a number of municipalities have embedded environmental justice goals into their comprehensive plans. For example, as of 2018, all local governments in California are required to have an "environmental justice element" in their general plans if the local jurisdiction has a disadvantaged community identified within its boundaries (State of California 2016).[4] Local government alone cannot reverse existing racial segregation, concentrated poverty, and generations of disinvestments in certain neighborhoods without state or federal support. Nonetheless, the role of local government in shaping land use is key to addressing many local environmental justice problems. Although local land use tools are not usually considered part of the environmental management system, local policies strongly influence which communities are disproportionately impacted by environmental burdens.

## Summary

The histories of environmental and public health are intimately intertwined: Both arose from concerns about human health and well-being in urban environments. However, as the systems to address these concerns developed, connections between the agencies that manage them were not maintained. As Jason Corburn noted, "As new agencies were established and separate disciplinary 'silos' emerged for urban issues, professional specialization increased and collaborative work between the fields decreased, further separating public health from urban planning" (Corburn 2009, 39).

Although environmental health is within the purview of the practice of public health, most health departments are directly responsible for only a small subset of environmental health determinants. The United States has a complex system for environmental management with interactions between federal, state, and local government entities separated by sector. As a result, local governments have limited ability to directly control environmental quality within their jurisdictions.

The concept of preemption is crucial to appreciating the limits that can be placed on local governments and their capacity to advance appropriate, innovative, health-protective strategies within their jurisdictions. Preemption is a legal doctrine whereby a higher level of government may limit, or even eliminate, the power of a lower level of government to regulate a certain issue. This is an essential foundation of federal environmental protection laws which provide consistent regulation of pollution and goals for environmental quality nationwide (Andrews 2006). As a consequence of preemption, however, there may be limits to local innovation, flexibility, and ability to respond to community priorities. Recently, preemption has been used by state legislatures to constrain localities' ability to adopt policies that are more protective of health or the environment, effectively setting a "ceiling" on public health protection (Change Lab Solutions 2013). For example, in 2018 California and Washington passed bills blocking localities from enacting taxes on sugary beverages (Sanger-Katz 2018). Conversely, states may have laws explicitly allowing localities to pass stricter regulations, or may be silent on the issue (ChangeLab Solutions 2013). Local initiatives need to clearly understand how existing federal and state environmental protection systems may constrain local discretion to respond to their particular environmental health concerns.

To be effective, local environmental health initiatives must be aware of the federal, state, and municipal environmental policy frameworks that impact the problems facing their communities. They also need to determine whether the problem at hand results from inadequate standards, insufficient enforcement of existing standards, or cumulative impacts of activities in multiple sectors. Sometimes significant scientific uncertainties, limited environmental monitoring, and data gaps make it difficult to characterize exposures at the community level.

A starting point for many local initiatives is recognizing that while environmental regulations aim to protect human health, standards may be

based on old science, balanced with economic considerations, or monitored on such a large geographic scale that local "hot spots" are missed. As a result, local populations may experience environmental health problems even when relevant federal regulations are being met. In order to pursue effective systems changes, local environmental health initiatives must understand the history, institutional structure, and limitations of the existing federal and state environmental health policies affecting their issue of concern. It is particularly important to appreciate the abilities and limitations of local governments, including regulation of land use, infrastructure, development, and housing. Initiatives targeting local systems are often better suited than are state or federal efforts to coordinate among various sectors, shape cumulative patterns of development in the urban environment, and respond to stakeholders' concerns. Thus, local environmental health initiatives have the potential to form bridges spanning the gaps between public health and environmental management.