A National Strategy to Revitalize Environmental Public Health Services

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Preface

Developing a strategy to enhance environmental public health services

PROCESS

The process of developing the Centers for Disease Control and Prevention's (CDC's) *National Strategy to Revitalize Environmental Public Health Services* required input from stakeholders representing all areas of environmental public health. The stakeholders included officials from nongovernmental environmental public health organizations; state, territorial, and local health agencies; tribal governments; undergraduate- and graduate-level environmental health and public health academic programs; and several federal agencies. CDC's National Center for Environmental Health (NCEH) led and facilitated the process.

NCEH formed an internal steering committee with the initial task of identifying stakeholders who were interested in and committed to delivering environmental public health services. The committee was tasked to create issue papers on the following critical environmental public health areas: capacity building, research, leadership, communication and marketing, workforce, and strategic partners. The committee identified approximately 150 agencies and organizations from the public health practice community, academic community, advocacy organizations, communities with special interests, and CDC and other federal agencies. From this list, NCEH invited 31 members that represented a cross section of the critical environmental public health areas to form an official External Partners Work Group.

The External Partners Work Group reviewed the issue papers prepared by the internal steering committee on the critical environmental public health areas. The internal steering committee hosted a national teleconference and a 2-day meeting in Atlanta, Georgia, to facilitate and encourage comments and dialogue from the work group. At this meeting, the work group members constructed concrete goals and objectives to accompany the issue papers on the critical environmental public health areas. The issue papers, goals, and objectives were translated into *A National Strategy to Revitalize Environmental Public Health Services* and then circulated to all 150 stakeholders for review. After integrating their comments, the committee circulated a second draft, and additional changes to the plan were discussed and incorporated.

A National Strategy to Revitalize Environmental Public Health Services is a working document that will be modified over time. The strategy includes six goals, each of which has several objectives. The next step will be to identify resources; create a time line for accomplishing objectives; and organize, prioritize, and implement the plan's activities.

Range of Environmental Public Health Services As Reported by Local Health Departments

Restaurant Inspections • Sewage Disposal Systems • Private Water Supply Safety • Swimming Pool Inspections • Groundwater Pollution Control • Vector Control • Environmental Emergency Response • Food and Milk Control • Recreational Facilities Inspections • Surface Water Pollution • Public Water Supply Safety • Solid Waste Management • Animal Control • Hazardous Waste Management • Indoor Air Quality • Health Facilities Inspections • Occupational Safety and Health • Noise Pollution • Radiation Control

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Thanks to our many partners who contributed their thoughts, ideas, and suggestions to the development of the strategy.

100 Black Men of America, Inc. • Advisory Committee to National Center for Environmental Healt • Agency for Toxic Substances and Disease Registry • Air and Waste Management Association • Alaska Native Medical Center • Alliance to End Childhood Lead Poisoning • American Academy of Environmental Medicine • American Academy of Pediatrics • American Academy of Sanitarians • American Association of Health Plans • American Association of Poison Control Centers • American Association of Public Health Physicians • American College of Occupational and Environmental Medicine • American Hospital Association • American Indian Policy Center • American Lung Association • American Mosquito Control Association • American Planning Association • American Public Health Association • American School Food Service Association • American School Health Association • American Water Works Association • Asian and Pacific Islander American Health Forum • Association of American Indian Physicians • Association of Asian Pacific Community Health Organizations • Association of Environmental Health Academic Programs • Association of Occupational and Environmental Clinics • Association of Public Health Laboratories • Association of Schools of Public Health • Association of State and Territorial Health Officials • Association of State and Territorial Solid Waste Management Officials • Association of Teachers of Preventive Medicine • Center for Health, Environment and Justice • Centers for Disease Control and Prevention • Centers for Medicare and Medicaid Services • Center for Science in the Public Interest • Children's Defense Fund • Children's Environmental Health Network • Children's Health Environmental Coalition • City of Albuquerque Environmental Health Department • Clean Water Action • Coalition for Healthier Cities and Communities • Consumer Federation of American • Council of State and Territorial Epidemiologists • Department of Agriculture • Department of Health and Human Services • Emory University • Environmental Council of the States • Environmental Defense • Environmental Law Institute • Environmental Protection Agency • Environmental Support Center • Environmental Working Group • Federal Emergency Management Agency • Food and Drug Administration • Food Marketing Institute • Georgia Department of Environmental Protection • Grocery Manufacturers of America • Health Resources and Services Administration • Housing and Urban Development • Illinois Department of Health • Indian Health Service • Institute of Food Technologists • International Association for Food Protection • Johns Hopkins University • Lincoln-Lancaster County Health Department • Minority Health Professions Foundation • National Alliance for Hispanic Health • National Association of Community Health Centers • National Association of County and City Health Officials • National Association of Emergency Medical Technicians • National Association of Environmental Professionals • National Association of Noise Control Officials • National Associations of Local Boards of Health • National Center for Lead-Safe Housing • National Conference of Local Environmental Health Administrators • National Conference of State Legislatures • National Education Association • National Environmental Education and Training Foundation • National Environmental Health Association • National Environmental Trust • National Food Processors Association • National Governors Association • National Hispanic Medical Association • National Institute for Environmental Health Sciences • National League of Cities • National Medical Association • National Pest Management Association • National Restaurant Association • National Rural Health Association • National Safe Kids Campaign • National School Boards Association • National Urban League • Natural Resources Defense Council • Ohio University • Pew Commission on Environmental Health • Physicians for Social Responsibility • Public Health Foundation • Sierra Club • Society for Occupational and Environmental Health • Society for Public Health Education • Tulane University • U.S. Conference of Mayors • U.S. Public Interest Research Group • Underwriters Laboratories, Inc. • Union of Concerned Scientist • University of Albany • University of Georgia • University of Kansas • University of New Mexico • University of Washington • Urban Land Institute • Volusia County Public Health Unit

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We recognize and offer a special thank you to the following people who represented their organizations in the development of this strategy. Their dedication to revitalizing environmental health services made their contributions invaluable. We look forward to our continued partnership during the implementation of this strategy.

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SEWAGE
OUTFALL
Located 300 ft.
below waterline
NO SWIMMING
OR DIVING
OF ANY KIND


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Executive Summary

Defining environmental public health services

The term "environmental public health services," which is used throughout the document, represents those services managed by public health agencies that deal with environmental public health issues. As stated by Larry Gordon, former president of the American Public Health Association, "Environmental public health practitioners are involved not only in inspections, but perhaps more importantly in surveillance, warnings, permitting, grading, developing compliance schedules and variances, risk assessment, risk communication, public information, exposure evaluation, seeking injunctions and other legal remedies, embargoing, sampling for analyses, education, consultation, community networking, problem prioritization, policy development, marketing the values and benefits of environmental public health, plan and design review and approval, and epidemiology. Such activities are essential to a modern, effective program" (L. Gordon, personal communication, November 30, 2001).

PURPOSE

Environmental public health services and sanitation have been the backbone of public health in the United States since 1798. The emergence of many new issues and threats—such as *Cryptosporidium*, hantaviruses, *Escherichia coli* O157:H7, West Nile virus, and most recently, homeland terrorism—points to a need for a well-prepared environmental public health system and workforce. The system and workforce must be able to anticipate, recognize, and respond to these types of threats. Lack of support for state, tribal, territorial, and local environmental public health programs has led to a system that is ill-prepared to address these threats.

During the 1990s, a series of reports from think tank agencies,[1] the World Health Organization (WHO),[2] and the Centers for Disease Control and Prevention[3] (CDC) rated environmental concerns among the most important health issues and global threats. They also ranked environmental public health and sanitation accomplishments among public health's greatest accomplishments. The 30-year increase in life expectancy to 76.7 years from 1900 to 1998 has been attributed to environmental public health monitoring and regulation of the water supply, sewage systems, and food quality, as well as to immunizations and primary preventive care.[4] As a result of proper sanitation, more than 80% of human disease has been eliminated.[3] The strong tradition of environmental public health and sanitary services was maintained through the middle 1960s, when new environmental problems gathered attention: globalization of the food supply; contamination of drinking water; air and noise pollution; ionizing radiation; proliferation of solid and hazardous waste, disease vectors, and wastewater; and degradation of housing, institutional services, and environmental conditions in child-care facilities.

The emergence of many new issues and threats . . . *Cryptosporidium* in drinking water, hantaviruses, *Escherichia coli* O157:H7, West Nile virus, and most recently, homeland terrorism . . . points to a need for a well-prepared environmental health system . . .

The U.S. Department of Health and Human Services' *Report to the President and Congress*[5] from 1988 estimated an environmental public health workforce of 235,000 in 1980, with 37,500 needing training in public health. The report also forecasted the need for an additional 137,000 environmental public health professionals on the basis of an expected population growth over the next decade and the expanded responsibilities of the environmental public health workforce. Twenty years later, the *Public Health Workforce*: *Enumeration 2000* report[6] tabulated the size of the environmental public health workforce at 19,431. This statistic is supported by an analysis by the National Environmental Health Association that the number of positions in environmental public health has been shrinking and that there is an inability to fill

open positions (N. Fabian, personal communication, December 6, 2001).

The field of environmental public health has expanded over the last 50 years to cover many new responsibilities, such as poor air quality, childhood lead poisoning, asthma, and exposures to hazardous chemicals. In addition, new and complex technologies are now available. Leadership is essential to ensure that all of the priority issues are coordinated and addressed. CDC has a history of leadership in the field of infectious disease management and plans to carry that reputation to the field of environmental public health services. Forward-thinking leadership is necessary to provide an interface among federal agencies with an environmental public health mandate and officials in state, tribal, territorial, and local programs to build enduring relationships and partnerships. This leadership will increase the likelihood that decisions made by federal officials optimally affect public health and that the concerns of officials in state, tribal, territorial, and local environmental public health programs are communicated to federal agencies.

The implementation of the goals, objectives, and activities described in this plan will enhance our ability to achieve CDC's vision for the 21st century: healthy people in a healthy world through prevention. Many of the activities described herein build upon existing or developing efforts or are in the planning stages. CDC's plan to protect people from waterborne illness—*Healthy Water: CDC's Public Health Action Plan*[7]—presently in draft form, is an excellent example of one of these activities. All of these activities will require the stakeholders to build and improve long-term, strategic partnerships and to establish commitments.

Implementation of this strategy will help build capacity at all levels of government; support research to translate science into practice; foster the leadership necessary to apply the public health principles of assessment, policy development, and assurance in environmental public health; improve our ability to communicate and market environmental public health services; establish support systems to improve the performance of the environmental public health workforce across the United States; and create viable and long-lasting strategic partnerships among CDC stakeholders. Each goal is essential to the strategic plan and includes outcome objectives, activities, and evaluation components for the new approaches.

Typical Responsibilities of Environmental Public Health and Protection Programs*

- Ambient air quality
- Indoor air quality
- Water pollution control
- Safe drinking water
- Noise pollution
- Radiation
- Food safety
- Industrial hygiene
- Childhood lead poisoning
- Acid deposition
- Disaster planning and response
- Cross-connection elimination
- Healthy housing
- Institutional environmental control
- Recreational area environmental control
- Solid waste management
- Vector control
- Pesticide control
- Toxic chemical control
- On-site liquid waste disposal
- Unintentional injury control
- Bioterrorism
- Global environmental issues

* Source: *Environmental Health Competency Project: Recommendations for Core Competencies for Local Environmental Health Practitioners*, Appendix C, Page 16.

HIGHLIGHTS OF THE GOALS AND OBJECTIVES

The overarching goal of the strategic plan is to enhance and revitalize the system of environmental public health services to address the broad range of issues facing states and communities. This goal includes collaborating with environmental regulatory agencies, and it emphasizes prevention of disease and mortality.

Overarching Goal

Enhance and revitalize the system of environmental public health services in order to address the broad range of issues facing states and communities.

Goal I (Build Capacity)

This goal is intended to improve and support environmental public health services at the state, tribal, territorial, and local levels. Accomplishing this goal will enhance the nation's capability to prevent and respond to environmental public health threats and will improve practitioners' access to technology and other innovative tools.

Goal II (Support Research)

The intent of this goal is to enhance environmental public health services by (1) defining effective approaches to address existing and emerging needs, (2) identifying the environmental antecedents of disease outbreaks, (3) engaging community involvement, (4) encouraging innovative environmental public health practices and services that emphasize prevention, (5) defining strategic interventions, and (6) identifying and evaluating the impact of legal decisions on environmental public health services and practice.

Goal III (Foster Leadership)

Accomplishing this goal will enhance environmental public health services by developing strong working relationships among the stakeholders in environmental public health services and to assist state, tribal, territorial, and local health entities and other stakeholders improve the practice of environmental public health. This goal requires development of a National Environmental Health Service Corps or fellowship program to create a cadre of well-trained specialists who will become leaders at all levels of environmental public health service delivery.

Goal IV (Communicate and Market)

The intent of this goal is to improve communication and information sharing among environmental public health agencies, communities, policy makers, and others and enhance the significance and understanding of environmental public health. Achieving the goal also will define the structure of an effective system for sharing environmental public health information. This goal will be accomplished by promoting and disseminating strategies, education approaches, and models of best practices to engage communities and policy makers in discussions about environmental public health issues.

Goal V (Develop the Workforce)

This goal is intended to promote the development of a competent and effective environmental public health workforce to deliver contemporary services and address emerging needs. Implementation of this goal includes defining the scope of work as well as the size, composition, performance standards, and competencies of the environmental public health workforce and its current leadership. Accomplishing this goal will include activities that outline ways to develop an environmental public health workforce training system. Development of the National Environmental Health Service Corps or a fellowship program is also a critical component. In addition, these activities will support programs to increase the number and elevate the status of environmental public health practitioners who engage in competency-driven continuing education and training. This goal is in full

accordance with the CDC/Agency for Toxic Substances and Disease Registry (ATSDR) strategic plan for public health workforce development.[8]

Goal VI (Create Strategic Partnerships)

The intent of this goal is to foster partnerships among various agencies, organizations, and entities that influence environmental public health services and practice to advance marketing, communication, research, and training-program initiatives. This goal also will foster communication and interaction among stakeholders, especially policy makers.

Introduction

Environmental public health . . . touches everyone's life every day.

BACKGROUND

The diaries of 17th- and 18th-century Americans relayed the onslaught of one epidemic after another. The impact on individuals, families, communities, and the country itself was enormous. For example, in 1793, the U.S. capital, then located in Philadelphia, had to be evacuated because of a devastating yellow fever epidemic.

In 1850, Lemuel Shattuck wrote and presented the *Report of the Sanitary Commission of Massachusetts*, which became the blueprint for our current public health system. Shattuck recommended that state and local health departments be organized to oversee sanitary inspections, communicable disease control, food sanitation, vital statistics, and primary health-care services for women and children. The first laws enacted to protect health and ensure safety pertained to sanitation. Laws ensuring clean water, sewage management, and food service standards were promulgated 100 years before vaccination of children became law. As a result of proper sanitation, more than 80% of human disease has been eliminated. During the 1990s, a series of reports from think tanks,[1] the World Health Organization,[2] and the Centers for Disease Control and Prevention[3] (CDC) rated environmental problems among the most important health issues and global threats and ranked environmental public health/sanitation accomplishments among public health's greatest accomplishments.

The strong tradition of environmental and sanitary services maintained itself through the middle 1960s, when new environmental problems—air and noise pollution, ionizing radiation, proliferation of solid and hazardous waste, disease vectors, and wastewater; and degradation of housing, institutional services, and environmental conditions in child-care facilities, — gathered attention. The public health system neither had the resources nor the expertise to properly handle these "new" environmental issues.

During the 1970s, CDC produced a series of environmental guidelines on subjects such as drinking water standards, recreational water safety, and rodent control to assist health departments. Also in the 1970s, President Richard M. Nixon created, and Congress funded, the U.S. Environmental Protection Agency (EPA) by shifting critical personnel and fiscal resources from other federal health agencies. Environmental public health at that time, as mandated by Congress, focused on a regulatory framework with an engineering base. Consequently, resources for environmental public health programs based in health agencies became limited, and significant programmatic gaps resulted. The U.S. Public

Box 1. The Essential Public Health Services

PUBLIC HEALTH IN AMERICA

Vision of Public Health
Healthy people in healthy communities

Mission of Public Health
Promote physical and mental health and prevent disease, injury, and disability

Role of Public Health
- Prevents epidemics and the spread of disease
- Protects against environmental hazards
- Prevents injuries
- Promotes and encourages healthy behaviors
- Responds to disasters and assists communities in recovery
- Ensures the quality and accessibility of health services

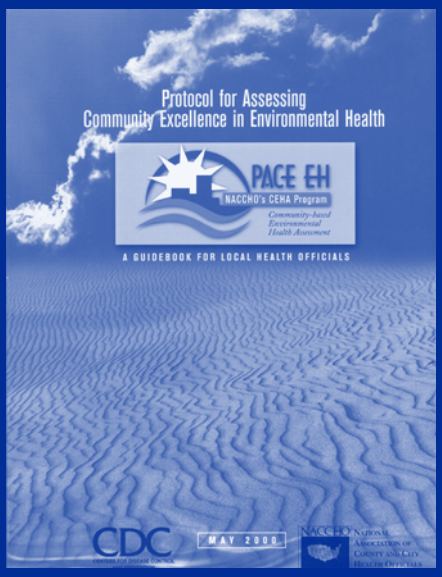
Essential Public Health Services
- Monitor health status to identify community health problems
- Diagnose and investigate health problems and health hazards in the community
- Inform, educate, and empower people about health issues
- Mobilize community partnerships to identify and solve health problems
- Develop policies and plans that support individual and community health efforts
- Enforce laws and regulations that protect health and ensure safety
- Link people to needed personal health services and ensure the provision of health care when otherwise unavailable
- Ensure a competent public health and personal health care workforce
- Evaluate effectiveness, accessibility, and quality of personal and population-based health services
- Research for new insights and innovative solutions to problems

Adopted: Fall 1994, Source: Public Health Functions Steering Committee, Members (July 1995):

Health Service has estimated that the proportion of U.S. health expenditures used for population-based public health measures, including environmental public health services, declined by 25% from 1981 to 1993, even though these overall health expenditures increased by 210%.[9] Also during the 1980s, other topical issues and concerns gained attention.

In 1987, the Institute of Medicine (IOM) convened an expert committee to examine public health in the United States. The resulting document, *The Future of Public Health*, published in 1988,[10] outlined the dilemma facing public health throughout the nation and recommended that public health practice return to its focus on the community. The report laid out three core functions for public health practice: assessment, policy development, and assurance. The report's recommendations led to the development of partnerships among service agencies, academic institutions, businesses, and volunteer and advocacy organizations. To clarify the core functions, essential services were developed that included overarching systems management and research (Box 1). IOM has updated the original report to review the nation's public health capabilities and to present a comprehensive framework for how the government public health agencies, working with multiple partners from the public and private sectors as a collaborative public health system, can better assure the health of communities.[11] To assist public health practice in the effort to focus on community, a variety of assessment tools were created and field tested. This effort included development of the *Protocol for Assessing Community Excellence in Environmental Health (PACE-EH)*,[12] a tool to help public health agencies and their communities work together to assess community environmental public health needs.

Protocol for Assessing Community Excellence in Environmental Health (PACE-EH)



In November 2000, the Departmant of Health and Human Services published the objectives for improving the nation's health, *Healthy People 2010*.[13] This document stated that "various reports and evaluations have described the continuing deterioration of the national public health system: health departments are closing, technology and information systems are outmoded, emerging and drug-resistant diseases threaten to overwhelm resources, and serious training inadequacies weaken the capacity of the public health workforce to address new threats and adapt to changes in the health-care market." The document also reported "all public health services depend on the presence of basic infrastructure." *Healthy People 2010* ranks the environment among the primary four factors affecting health and lists 30 objectives pertaining to environmental public health, including outdoor air quality, water quality, toxics and waste, healthy homes and healthy communities, infrastructure, disease surveillance, and global environmental public health. In addition, *Healthy People 2010* includes seven objectives for food safety and 17 objectives for occupational safety and health (Box 2).

Box 2. *Healthy People 2010* Environmental Health Objectives

***Healthy People 2010* Summary of ObjectivesGoal: Promote health for all through a healthy environment.**

Outdoor Air Quality
- **8-1** Harmful air pollutants
- **8-2** Alternative modes of transportation
- **8-3** Cleaner alternative fuels
- **8-4** Airborne toxins

Water Quality
- **8-5** Safe drinking water
- **8-6** Waterborne disease outbreaks
- **8-7** Water conservation
- **8-8** Surface water health risks
- **8-9** Beach closings
- **8-10** Fish contamination

Toxics and Waste
- **8-11** Elevated blood lead levels in children
- **8-12** Risks posed by hazardous sites
- **8-13** Pesticide exposures
- **8-14** Toxic pollutants
- **8-15** Recycled municipal solid waste

Healthy Homes and Healthy Communities
- **8-16** Indoor allergens
- **8-17** Office building air quality
- **8-18** Homes tested for radon
- **8-19** Radon-resistant new home construction
- **8-20** School policies to protect against environmental hazards
- **8-21** Disaster preparedness plans and protocols
- **8-22** Lead-based paint testing
- **8-23** Substandard housing

Infrastructure and Surveillance
- **8-24** Exposure to pesticides
- **8-25** Exposure to heavy metals and other toxic chemicals
- **8-26** Information systems used for environmental health
- **8-27** Monitoring environmentally related diseases
- **8-28** Local agencies using surveillance data for vector control

Global Environmental Health
- **8-29** Global burden of disease
- **8-30** Water quality in the U.S. Mexico border region

CDC's National Center for Environmental Health (NCEH) has administered environmental public health programs since the early 1970s. These programs have addressed such public health concerns as radiation exposure, Agent Orange exposure in U.S. service personnel, urban rodent control, and recreational pool safety. As needs were perceived, new initiatives and programs were developed. The approach was reactive and focused on responding to "hot-button" issues and congressional mandates. However, as time passed, CDC's need to increase its ability to address the expanding range of environmental public health issues and concerns affecting the 50 states, the District of Columbia, five territorial public health agencies, 3,215 local health departments, and approximately 700 tribal governments recognized by the United States and the individual states became evident (D. Moffett, personal communication, December 6, 2001).

Many units of CDC are active in different aspects of environmental public health. They include the National Center for Infectious Diseases (NCID) and NCEH. In addition, the National Institute for Occupational Safety and Health focuses on workplace-related safety and injury issues, and the Agency for Toxic Substances and Disease Registry (ATSDR) evaluates human health risk at hazardous waste sites listed under Superfund and at "brownfield" sites. CDC also is completing *Healthy Water: CDC's Public Health Action Plan*[7] to protect people from waterborne illness, which includes involvement from NCEH, NCID, and ATSDR. However, these activities have not focused on enhancing the delivery of day-to-day environmental public health services.

In 2000, CDC established the Division of Emergency and Environmental Health Services (EEHS) within NCEH. One of EEHS's major responsibilities is to improve core environmental public health services in the United States. Since its formation, EEHS has awarded 17 cooperative agreements to enhance environmental public health service capacity in states and communities. EEHS also has funded more than 30 smaller, project-focused activities. The mission of EEHS is to work with environmental public health stakeholders to

- Create a proactive approach to environmental public health services delivery
- Develop environmental public health leadership
- Develop a competent environmental public health workforce
- Improve environmental public health infrastructure in state and local health departments
- Develop a timely and relevant research agenda
- Develop methods for better communication with partners and communities

WHY REVITALIZING ENVIRONMENTAL PUBLIC HEALTH SERVICES IS CRITICAL

Revitalization of environmental public health services in the United States is important for four reasons: (1) many environmentally related conditions affect the health and lives of millions of citizens at significant cost, (2) many emerging and re-emerging public health problems require innovative environmental public health services interventions, (3) environmental public health is an important part of the public health response to terrorism and other emergencies, and (4) environmental public health services issues are becoming more complex. These reasons are expanded below, and several examples are summarized in Box 3.

Environmentally Related Conditions

Each year in the United States about 76 million cases of foodborne illness occur, with 325,000 hospitalizations and 5,000 deaths and ailments that are becoming more difficult to treat because of significant antibiotic resistance (Box 3).[14]

Protection of water supply is becoming more serious and complex as population urbanization increases. In Milwaukee, Wisconsin, at least 403,000 people became

Box 3. Examples of Environmentally Related Public Health Events

About 76 million cases of foodborne illness occur annually in the United States, with 325,000 hospitalizations and 5,000 deaths and ailments that are increasingly more difficult to treat because of significant antibiotic resistance.

In one study, 41% of wells surveyed were contaminated, and 50% of waterborne disease outbreaks were associated with individual or community water sources.

In Milwaukee, more than 403,000 people became ill from drinking water that had been contaminated because the system was not prepared to remove the small oocysts of *Cryptosporidium*.

A more virulent strain of *Escherichia coli (E. coli)* O157:H7 is causing new and more serious outbreaks of foodborne disease. *E. coli* has been associated with eating undercooked ground beef.

In Georgia, lack of proper recreational water management and oversight led to a severe *E. coli* O157:H7 outbreak in a recreational water park, leading to severe illness and the deaths of two children.

The use of antimicrobial drugs in agriculture has led to the appearance of drug-resistant strains of *Salmonella* and *Campylobacter*.

Urbanization and increased contact between humans and animals living in previously isolated areas has led to increased rates of Lyme disease and rabies.

Pollution from a variety of sources feeding into coastal estuaries of the Southeast allowed *Pfiesteria piscicida* to thrive.

Several disease-causing hantaviruses have been associated with specific rodent hosts in the United States, thus warranting recommendations to minimize human exposure to wild rodents.

Foodborne and waterborne outbreaks caused by Norwalk-like viruses are often observed in family units and in people residing in institutions.

ill during a 2-month period in 1993 from *Cryptosporidium* oocysts that passed through the filtration system of one of the city's water treatment plants.[15]

Approximately 50 people died. Water quality standards and testing of patients for *Cryptosporidium* were not adequate to detect the outbreak. The system that was developed to protect people became fragmented. Even though the Safe Drinking Water Act is meant to ensure potable water for the American people, approximately 22 million to 30 million people drink unregulated water, an unknown number drink under-regulated water,[16] and waterborne outbreaks related to water sources not covered by the Safe Drinking Water Act have increased 50% since 1998. Approximately 14 million U.S. households rely on domestic wells to supply their drinking water, and more than 90,000 new wells are drilled each year. In 1993, catastrophic floods affected the Midwestern states. In 1994, a large survey of well contamination produced startling results: coliform bacteria were present in 41.3% of wells and *Escherichia coli* (*E. coli)* in 11.1%; nitrate was detected in 65.4% of wells and atrazine (herbicide) in 13.6%. The reasons for the contamination were poorly constructed and poorly placed wells, which could be corrected through monitoring and education.[17]

Emerging Public Health Problems

In 1993, inadequately cooked ground beef that contained *E. coli* O157:H7 and that was served at fast-food restaurants in Washington, Idaho, California, and Nevada caused more than 500 illnesses and the deaths of four children.[18] *E. coli* O157:H7 also caused illness in 26 children and two deaths at a Georgia water park.[19]

West Nile virus, not detected in the Western Hemisphere until 1999, sickened 55 and killed seven people in New York City. Central Park was closed on July 24, 2000, for spraying, after mosquitoes infected with West Nile virus were detected.[20] West Nile virus remains a public health concern.

By June 2002, 318 cases of hantavirus pulmonary syndrome had been confirmed in the United States. The primary cause was human exposure to rodents carrying the Sin Nombre virus.[21]

Frontline environmental public health practitioners were essential in each of these cases to determine the cause of the problem, help remediate the environmental insult, or assist people affected by the events.

Public Health Response to Terrorism and Other Emergencies

From the city and state levels to the national level at CDC, environmental public health personnel are charged with coordinating emergency preparedness and response activities. They are specially trained to respond to radiation releases, to take samples of contaminated biologic specimens, to decontaminate people and sites, and to conduct other emergency-related activities.

Occupational health experts ensured that World Trade Center rescue workers were provided with proper respiratory protective equipment.

Immediately after the catastrophic phase of the terrorism of September 11, 2001, in New York City, environmental public health personnel were in the field. The first task was to coordinate with occupational health experts to ensure that rescue workers were provided with proper respiratory protective equipment and to begin surveillance of rescue workers' safety and health. The next step was to facilitate communication and consensus about health and safety issues among responding organizations. Environmental public health personnel surveyed all food service and food storage establishments, and during a 1-week period, gained access to and removed all food sources from more than 750 establishments. Finally, environmental public health personnel set more than 1,700 rodent bait stations and instituted a rodent monitoring system in the surrounding residential neighborhoods. However, because of limited personnel, almost all regular environmental public health protection services were temporarily suspended (J. R. Miller, personal communication, February 1, 2002).

Increasing Complexity of Environmental Public Health Issues

For the past 150 years, environmental public health services have focused on food, water, and sanitation.[3] These activities have been successful, and they have been codified into laws and regulations throughout the country. However, environmental public health has grown in complexity. In the 1970s, evaluating exposure to radon gas in residential structures and evaluating the environmental source of lead for poisoned children became important environmental public health issues. State and local environmental public health programs currently address issues related to the environmental public health management of re-emerging rodent problems,[22] confined animal feeding operations and their potential for animal waste spillage, and responsibility for defining the safety of "brownfield"-designated sites being converted for residential or clean commercial use.[23] Furthermore, the emergence of new infectious diseases and the re-emergence of "old diseases"[24] has prompted examination of the future role of environmental health.

One critical issue is the shrinking environmental public health workforce within health departments. Of the 450,000 public health workers employed by federal, state, tribal, territorial, and local agencies, approximately 10% are environmental public health workers. The National Environmental Health Association (NEHA) explained, "The number of positions in environmental public health has been shrinking. What makes the problem even worse is that for the positions that are available, many cannot be filled with capable people" (N. Fabian, personal communication, December 6, 2001). In addition, the number may be overestimated, because positions in environmental public health are fragmented among agriculture and environmental protection units. Also, a culture of indifference exists among environmental public health practitioners because of low pay scales, minimal advancement opportunities, and higher compensation in the private sector. A substantial portion of environmental public health workers learn needed skills on the job, then move into the private sector at much higher salaries (N. Fabian, personal communication, December 6, 2001). Two other issues facing environmental public health are that they often enter their positions lacking communication skills and then have little opportunity to learn those skills on the job.[25] Finally, the present workforce has many employees who will soon retire, making the workforce shortage even more acute.

Partnership and support systems for federal, state, tribal, territorial, and local environmental public health agencies and organizations need to be improved. National refocusing would assist in the following areas:

- Building capacity at all levels
- Supporting research to translate science into practice
- Fostering the leadership necessary to apply public health principles of assessment, policy development, and assurance in the field of environmental public health
- Improving ability to communicate and market environmental public health services
- Supporting systems to improve the performance of the environmental public health workforce across the United States
- Creating viable and long-lasting strategic partnerships among all the stakeholders

The following chapters lay out the overarching goal and the six strategic goals and their related objectives and activities. Each goal includes historical review and overview of the issues it affects.

"Environmental public health is one of the most vital and rapidly expanding fields of public health. The duties have moved far beyond that of the inspector or the regulator. The environmental public health specialist of the 21st century needs to be on the front lines of disease prevention, using new and effective tools and methods to investigate the environmental causes of disease and mortality. The September 11th attack and the environmental public health response are an example of the vital role that environmental public health must play in protecting the health of America."

– Dr. Richard Joseph Jackson, MD, MPH
Former Director, National Center for Environmental Health
Centers for Disease Control and Prevention

Summary of Goals and Objectives

Success in implementing the goals and objectives described in this plan will result in CDC reaching its vision for the 21st century: healthy people in a healthy world—through prevention. Achieving these goals and objectives will necessitate long-term, strategic partnerships, and a sustained commitment by all stakeholders.

Goal I: Build Capacity

Strengthen and support environmental public health services at the state, tribal, territorial, and local levels.

Objectives:

A. Expand the nation's capacity to anticipate, recognize, and respond to environmental public health threats and improve access to technology.

B. Support, evaluate, and disseminate the results of new demonstration programs, best practices, and CDC-supported projects designed to improve livability and prevent and control environmentally related illness.

C. Identify the range of activities, interventions, and resources available for delivering environmental public health programs in the United States, and maintain a continuous assessment process.

Goal II: Support Research

Support research to define effective approaches to enhance environmental public health services.

Objectives:

A. Identify environmental antecedents to disease outbreaks.

B. Engage community support for community-based environmental public health research.

C. Synthesize and disseminate relevant environmental public health services research findings.

D. Implement environmental public health service demonstrations and evaluations in the built and natural environments that lead to healthier communities.

Goal III: Foster Leadership

Foster strong leadership to enhance environmental public health services.

Objective:

Provide guidance, training, and assistance to state, territorial, and local health departments; tribal governments; and other stakeholders to specifically build and enhance leadership capabilities.

Goal IV: Communicate and Market

Improve communication and information sharing among environmental health agencies, communities, strategic partners, and other stakeholders and better market environmental public health services to policymakers and the public.

Objectives:

A. Identify and promote community-based strategies to elevate the image, importance, and need to improve environmental public health services.

B. Support educational approaches and models of best practices to gain community support and participation in addressing environmental public health service issues, concerns, and best models to organize, deliver, and market them.

Goal V: Develop the Workforce

Promote the development of a competent and effective environmental public health services workforce.

Objective:

Provide support to develop the environmental public health service workforce through enumeration, performance standards, training, recruitment, and retention activities.

Goal VI: Create Strategic Partnerships

Foster interactions among agencies, organizations, and interests that influence environmental public health services.

Objective:

Coordinate and promote activities that identify critical stakeholders and foster communication and interaction among agencies, organizations, and interests that influence environmental public health services.

Goals, Objectives, and Activities

CDC's Plan:

A National Strategy

To Revitalize

Environmental Public

Health Services

Overarching Goal

Enhance and revitalize environmental public health services to address the broad range of issues facing the nation.

REVITALIZATION IS NEEDED

This overarching goal is based upon the following environmental public health generalizations that affect state, tribal, territorial, and local public health agencies.

Environmental Health Generalizations

There is an insufficient number of practitioners and properly trained environmental public health specialists.

In the public sector, environmental public health personnel are underpaid compared with their counterparts in the private sector, leading to many vacant positions and high turnover rates.

Service delivery techniques often are outdated. Many employees in the environmental public health workforce do not fully benefit from available technology and information management.

The "Essential Public Health Services" (see Box 1) and a health outcomes analysis approach have had minimal effect on environmental public health practice and the delivery of environmental public health services.

Substandard residential housing, school buildings, and day-care facilities pose potential risks to health and have received little attention from environmental public health programs.

The demand for expanded environmental public health services and new and emerging threats are diluting service delivery.

More stakeholders need to be engaged in the process of delivering environmental public health services at the community level.

INNOVATIVE PROGRAMS

This overarching goal is based upon the following environmental health generalizations that affect state, tribal, territorial, and local public health agencies.

Examples of Innovative Programs

The Philadelphia Department of Health decreased the number of inspections it conducted by training staff in food-service establishments to function as food-safety managers. The health department now serves more of an assurance function than a service-delivery function.

The Columbus (Ohio) Health Department transformed its environmental unit into an assurance/assessment unit that works with several city agencies to tackle a variety of health problems. One multiagency program that is highly successful helps relocate to safe and livable housing those people who are at increased health risk because of inadequate or condemned housing.

The Albuquerque Environmental Health Department instituted a community-focused environmental assessment program that defines the appropriate collaborative activities to address health issues.

At the request of the tribal chairman of a reservation in North Dakota, CDC helped assess and develop strategies to correct potential problems associated with mold in housing.

The state of South Carolina established a statewide environmental risk assessment unit to evaluate chemical exposure and potential adverse health effects. The County of Sacramento (California) Environmental Management Department combined the environmental public health and environmental protection functions into an integrated, health-focused unit to improve service delivery.

Goal I. Build Capacity

Strengthen and support environmental public health services at the state, tribal, territorial, and local levels.

Environmental Health Generalizations

"In its broadest sense, environmental public health comprises those aspects of human health, disease, and injury that are determined or influenced by factors in the environment. This includes the study of both the direct pathological effects of various chemical, physical, and biological agents as well as the effects on health of the broad physical and social environment, which includes housing, urban development, land use and transportation, industry, and agriculture."

– Health People 2010

FRAMEWORK FOR ENVIRONMENTAL PUBLIC HEALTH SERVICES

Health concerns all sectors of society and is the responsibility of each individual. Ensuring a healthy society requires work by many agencies and organizations: public, private, for-profit and nonprofit, businesses, and advocacy groups, all weaving their contributions into a cloth called "health." The discussion on capacity building focuses on protection of the community as a whole as well as protection of individual citizens.

The U.S. public health system comprises organized federal agencies; state departments of health, tribal and territorial health units; and the 3,215 local public health agencies. The legal mandate to ensure the health of U.S. citizens is carried out, in most instances, at the local level. However, the interaction between state and local health departments varies. Fifteen states operate under a centralized system, in which the state directly operates local service or provides all public health services. Twenty-six states operate under a decentralized system in which the local government forms and operates local health departments. Two states operate a shared system in which the state selects health officers and reviews the budget. Nine states operate in a centralized/decentralized mode in which the state provides services in areas that have no local health department.[26] Finally, thousands of environmental public health programs are not assigned to health departments but implement significant public education campaigns, community-based programs, and control activities (e.g., environmental regulatory agencies, licensing and fees departments).

The vast majority of state health departments have environmental public health units. These units generally transmit funds from the federal and state levels to local health departments, collect environmental tracking data, and operate statewide programs (e.g., emergency medical services; toxic-agent risk assessments; emergency preparedness, response, and recovery; and childhood lead poisoning prevention). For many communities, local environmental public health services programs include drinking water protection; food-service inspections; on-site wastewater management, permitting, and inspection; and vector and animal control. In many larger communities, local environmental public health services programs parallel state environmental public health services programs. In many instances, however, state and local health departments do not have uniform environmental public health services. In some states and municipalities, multiple agencies manage environmental public health issues such as local air pollution, water and sewage, emergency management, and social services. A variety of frameworks involve state health departments and their environmental protection counterparts. For example, environmental protection units implement EPA's regulatory mandates. Most state health departments interact only with their environmental protection counterparts

when a crisis arises. In some states (e.g., South Carolina), one state agency is responsible for all health and environmental regulatory issues. Other states (e.g., Georgia) have a separate health department and environmental protection division. Some local health departments (e.g., city of Chicago) distinguish between health and environment. The unique needs of tribal governments are defined under the Federal Trust Document, whereby the federal government protects Native American land and people (B. Tomhave, personal communication, December 5, 2001).

The field of public health is changing. Many health agencies are moving away from service delivery to operating by the core functions of assessment, policy development, and assurance. Essential to this systems management approach is strategic problem solving. Unfortunately, many environmental public health service programs continue to implement their mandates in a traditional "stovepipe" manner. For example, the measure of productivity in a food-service program may be the number of inspections; for septic-system inspections, it may be the number of septic-tank system permits, inspections, or land evaluations instead of improvements in community health outcomes. The public health field needs to move toward evaluating the effect of environmental public health services on health. For example, eliciting the number and types of foodborne illnesses in a community would lead to defining the most effective methods for preventing disease.

CDC Works with Partners to Build Capacity

Diseases and health problems that are spread through water, food, air, waste, and other vectors pose serious public health threats. Many state and local public health departments lack the resources to prevent or respond to many environmentally caused diseases. Moreover, a lack of information on the types and amounts of toxic substances that affect people's health hinders public health efforts to address these problems.

To assist the state and local public health departments to better prevent or respond to environmental public health issues, CDC funds several state and local public health departments' capacity-building cooperative agreements, such as the following:

- City of Philadelphia Department of Public Health and New York City Department of Health–To develop urban commensal rodent control and environmental improvement and safety projects
- State of New Mexico Department of Health, the Island County (Washington) Health Department, Allegheny County (Pennsylvania) Health Department, Wisconsin Department of Health and Family Services, and the Iowa Department of Public Health–To build environmental public health services capacity in state and local departments of public health

CDC also funds cooperative agreements to develop the capacity of selected schools of public health to assist state and local health departments in developing effective, state-of-the-art environmental public health programs to improve the response to current and emerging health threats and to expand the science base in environmental public health to improve public health practice. Examples are as follows:

- Emory University, Johns Hopkins University, the University of Alabama-Birmingham, and the University of Illinois-Chicago–To support communities of excellence in environmental public health services
- University of North Carolina at Chapel Hill–To determine effective procedures in conducting environmental assessments at public events and to study chlorine inactivation of *Cryptosporidium*
- University of Washington–To develop training modules on essential environmental public health services
- Tulane University–To develop training modules for practitioners new to the field of environmental public health

Following are the objectives and their corresponding activities to strengthen and support environmental public health services at the state, tribal, territorial, and local levels.

Objective I-A: Expand the nation's capacity to anticipate, recognize, and respond to environmental public health threats and to improve access to technology.

Activity I-A-1: Increase the number of capacity-building and demonstration cooperative-agreement programs.

Activity I-A-2: Create and maintain a contact list of all state, territorial, local, and tribal environmental public health service units (e.g., agencies, departments, divisions, programs).

Activity I-A-3: Provide guidance, training, consultation, and technical assistance to state, tribal, territorial, and local agencies.

Activity I-A-4: Evaluate and periodically distribute information about new and effective technologies and tools.

Activity I-A-5: Support efforts by environmental public health programs to train personnel in the use of new technologies.

Objective I-B: Support, evaluate, and disseminate the results of new demonstration programs, best practices, and CDC-supported projects designed to improve livability and to prevent and control environmentally related illness.

Activity I-B-1: Evaluate currently funded environmental public health service projects[22, 27, 28] and disseminate results to strategic partners and other stakeholders.

Activity I-B-2: Support the development of science-based strategies for state and local public health agencies to improve health and well-being through improved land-use decisions.

Activity I-B-3: Promote institutional and strategic changes to foster ongoing coordinated efforts with strategic partners (e.g., Department of Housing and Urban Development, EPA, state and local health departments) and other stakeholders to implement and evaluate environmental interventions to improve health and well-being for urban and rural residents.

Objective I-C: Identify the range of activities, interventions, and resources available for delivering environmental public health programs in the United States, and maintain a continuous assessment process.

Activity I-C: Conduct ongoing environmental public health capacity needs assessments as part of the mandated assessment of public health needs by Public Law 106-505, Public Health Threats and Emergencies Act (Frist-Kennedy Bill).

Goal II. Support Research

Support research to define effective approaches to enhance environmental public health services.

SETTING THE RESEARCH AGENDA

Environmental public health services cover a broad range of activities, including inspecting food establishments, working with developers to properly design and manage on-site wastewater disposal systems, analyzing the environment for sources of childhood lead poisoning, analyzing and controlling "sick building syndrome," controlling mosquitoes and other vectors, issuing fish and shellfish advisories on the basis of contamination levels, and controlling and managing exposure to hazardous substances. The field of environmental public health and the breadth of problems related to environmental public health require an expanded research agenda to explain the relation among the environment, livability, and incidence of disease. An understanding of this relationship is essential to improve prevention approaches.

Many environmentally related conditions (such as *Cryptosporidium* in water, *E. coli* O157:H7 in food, outdoor air quality, mold, and insect infestation) lead to adverse health conditions. Annually, there are 76 million cases of foodborne illness, with approximately 325,000 hospitalizations and 5,000 deaths. A recent study of approximately 5,000 private water wells in the United States showed coliform contamination in 42% of the wells. Fifty percent of waterborne disease outbreaks were associated with individual or noncommunity water sources, and individual wells served nearly 15% of the U.S. population.[29] Compounding the problem in some areas is the rapid growth of on-site waste disposal systems. In a large suburban Atlanta county, more than 80,000 on-site waste disposal systems are in place and 3,000 to 4,000 systems are added each year. According to the U.S. census, approximately 26% of Florida's population is served by on-site sewage treatment and disposal systems. Approximately 1.8 million systems are in use statewide, discharging 450 million gallons of partially treated, nondisinfected wastewater to the environment each day. Approximately 40,000 new systems are installed each year.[30]

In addition, significant indoor air-quality problems are linked to "sick-building syndrome" in the workplace and in schools. Likewise, significant health problems are associated with contaminated recreational water, rodent infestation and the spread of hantavirus, and childhood lead poisoning. Lead exposure, primarily from lead-based paint and dust in older housing, translates into elevated blood lead levels in 434,000 U.S. children younger than 6 years of age.[31] To address these and other issues, CDC needs to expand its intramural and extramural research agenda. A discussion of those priority research areas follows.

Developing Alternative Sewage Disposal Systems

Because many of the best lots to build residential and commercial structures have already been developed, builders have resorted to building on lots with poor soil and inadequate drainage, leading to contamination of adjacent properties and local waterways. New or alternate systems should be evaluated and research conducted to identify new and more effective approaches to wastewater management.

Modifying Urban Environments

Urban sprawl and excessive commuting traffic affect the health of U.S. communities. For example, nitrous oxide, sulfur dioxide, and formaldehyde in the air result primarily from vehicle exhaust. Research is needed to establish the parameters of their effect on

Modifying Urban Environments

Scientific Research Agenda on the Effect of Community Design and Land-Use Choices on Public Health

- Research methods and data sources
- Physical activity, obesity, and transportation choices
- Schools and children
- Unintentional injuries
- Crime and violence
- Effect of community design on people with disabilities
- Health effects of air and water pollution
- Mental health
- Social capital
- Environmental justice and social equity
- Cross-cutting issues

land-use decisions and of community design on health. Innovative approaches to manage these and other problems that affect environmental public health need to be explored, evaluated, and implemented.

Monitoring Wells

Floods in the Midwest and South during the mid-1990s demonstrated severe deficiencies in well-water safety and integrity. A multistate study of 5,000 wells conducted in 1994 revealed that 41% were contaminated with coliform bacteria, 11% were contaminated with *E. coli*, and 61% were contaminated with nitrates. In subsequent evaluations of proper well construction and sealing, nearly 80% were deficient.[17] Public water supplies and distribution systems generally found in urban settings often are outdated. Research could establish acceptable parameters for well construction and maintenance and demonstrate the efficiency and safety of recommended approaches.

Defining the Environmental Antecedents of Disease Outbreaks

No national system correlates disease outbreaks with their environmental antecedents, especially in relation to food-service establishments, water and sewage systems, and mold-associated and vectorborne diseases. A scientific environmental basis for ongoing environmental epidemiologic tracking and monitoring needs to be established, and cost-effective antecedent monitoring systems need to be designed, field tested, and implemented.

Defining the Structure and Size of the Environmental Public Health Workforce

Workforce evaluations are needed to ascertain the current level of competence, methods of training, effect of training, effect of the "essential services" approach to environmental public health, relations between competencies and practices as they pertain to community-based needs, information that reaches the environmental public health workforce, and effect of workforce-directed activities on the level of competence and job performance.

Identifying and Disseminating Model Environmental Public Health Statutes, Administrative Rules, and Local Ordinances

CDC and ATSDR are partners with the Johns Hopkins University School of Public Health and Georgetown University School of Law on the Public Health Law Project. CDC funded a 3-year award to establish the Center for Law and the Public's Health located at the Johns Hopkins School of Public Health in East Baltimore. The Center partners with the CDC Public Health Law Program and other organizations to

conduct applied research, training and education, and other activities to strengthen the contribution that law makes to improved health. Information drawn from that project will be shared with environmental public health programs across the country, and gaps in information should be brought to the project's attention. More information is available at URL http://www.law.georgetown.edu.

Following are the objectives and their corresponding activities to support research to define effective approaches to enhance environmental public health services.

Objective II-A: Identify environmental antecedents to all disease outbreaks.

Activity II-A-1: Determine and support the research required to identify and define the environmental antecedents of disease outbreaks.

Activity II-A-2: Disseminate relevant research findings to strategic partners and other stakeholders, and assist with their interpretation.

Objective II-B: Engage community support for community-based environmental public health research.

Activity II-B-I: Define and evaluate a process to elicit community involvement in environmental public health research.

Activity II-B-2: Promote the use of the *Protocol for Assessing Community Excellence in Environmental Health (PACE-EH)* among stakeholders (e.g., state, tribal, territorial, and local entities).

Objective II-C: Synthesize and disseminate relevant research findings on environmental public health services.

Activity II-C-1: Develop and distribute to strategic partners and other stakeholders a list of environmental public health research projects conducted by agencies, academic institutions, industries, and others.

Activity II-C-2: Develop "best practices" guidelines based on current research in various areas of environmental public health service and practice.

Objective II-D: Implement environmental public health service demonstrations and evaluations in the built and natural environments that lead to healthier communities.

Activity II-D-1: Support demonstration projects that describe strategic interventions designed to improve community health.

Activity II-D-2: Evaluate best practices and gaps related to laws, ordinances, and regulations that affect environmental public health service delivery and practice.

Goal III. Foster Leadership

Foster leadership to enhance environmental public health services.

DEVELOPING THE NATION'S LEADERS

Leadership in public health comes from the federal, tribal, territorial, state, and local public health workforce; communities; academic institutions; affiliated organizations; advocacy and volunteer organizations; and business and commerce. William Keck, a health officer from Akron, Ohio, wrote in 1992, in the *American Journal of Public Health* "Effective public health agencies of the future will be all of the following: facilitators for strong and meaningful community participation in the assessment and prioritization of community health problems, major participants in public policy decision making, and leaders focused on health outcomes as the measure of the impact of intervention."[32] This statement also holds true for environmental public health.

Under the umbrella of leadership, the American Public Health Association published *Healthy Communities 2000: Model Standards*[33] as a guideline for community attainment of national health objectives. The document elaborated on 18 model standards and goals for environmental health: air quality, food protection, noise control, radiological health, sanitation in various facilities (e.g., general, child care, mobile home parks, public buildings, recreational areas, schools), solid waste management, toxic and hazardous substances, vector and animal control, wastewater management, safe drinking water, housing services, institutional services, and community monitoring. The IOM report, *The Future of Public Health*, reaffirmed that local public health agencies are "the final delivery point for all public health efforts" and called for "policy development and leadership that foster local involvement and a sense of ownership, that emphasize local needs, and that advocate equitable distribution of public resources and complementary private activities commensurate with community needs."[10] Across the country, programs under the domain of environmental public health have emerged.

State public health agencies must also lead the way in ensuring public health. Along with their environmental regulatory agency counterparts, they are responsible for establishing statewide health objectives, delegating power to local agencies, and holding them accountable. According to *The Future of Public Health*, states are vested with responsibility for "support of local service capacity, especially when disparities in local ability to raise revenue and/or administer programs require subsidies, technical assistance, or direct action by the state to achieve adequate service levels."[10] State public health agencies, including their environmental health components, and other state environmental agencies are pivotal for receiving, dispersing, and accounting for federal environmental public health resources.

Partners play a key role in environmental public health leadership development. National Association of County and City Health Officials (NACCHO) completed the Environmental Health Priorities Project.[25] The results of the project are based on an analysis of focus-group responses, key informant interviews with environmental public health leaders, and discussions with its Environmental Health and Prevention Advisory Committee. The resulting document provides recommendations covering five broad thematic categories: national leadership, workforce development, integration, promotion, and funding. The NACCHO document states that "future issues for local environmental health included (1) uncontrolled growth; (2) re-emergence of traditional environmental health concerns; (3) deteriorating public health infrastructure; (4) the impacts of an aging population; (5) changes due to better understanding of the human

genome; and (6) a lack of long-term planning, vision, and concern."[25] The recommendations offer action options that CDC, ATSDR, NACCHO, and others can take to enhance the future of environmental public health services and practice.

America's Environmental Health Gap, a Pew Environmental Health Commission report, challenges the nation to deal with the role of the environment and the antecedents of disease. The report states that "there is a national leadership void, resulting in little or no coordination of environmental health activities. As a result, public health prevention efforts are fragmented and too often ineffective in reducing chronic and disabling diseases and conditions."[34]

NEHA has produced competencies for the environmental public health workforce. These competencies define the knowledge, attitudes, and behaviors required by environmental public health practitioners to carry out their jobs effectively. These competencies will be coordinated with the process presently under way to produce performance standards for environmental public health services.

CDC funded and provided technical assistance to NACCHO and its partners to produce and disseminate *PACE-EH*,[40] which assists communities in evaluating their environmental public health issues and priorities and which involves the assistance of environmental public health units. *PACE-EH* has been field tested by communities with effective local environmental public health department leadership.

CDC's Division of Emergency and Environmental Health Services is a leader in establishing national policy, creating a framework for debate, and setting national health goals and standards. CDC funds 12 major environmental public health projects with state and local health departments and schools of public health. To maintain its leadership role, CDC needs to expand its funding and technical assistance to support state, tribal, territorial, and local agencies and organizations in addressing contemporary, new, and re-emerging environmental issues and threats.

The American Public Health Association (APHA), the Association of State and Territorial Health Officials, NACCHO, the National Association of Local Boards of Health, and the Public Health Foundation are completing a project that will lay out comprehensive public health performance standards based upon the delivery of IOM's essential public health services (Box 1). Implementation will require development of guidelines and standards to improve workforce training and availability of technical assistance.

A core of leaders in environmental public health needs to be created at the federal, state, tribal, territorial, and local levels. CDC has proposed creation of an Environmental Public Health Services Corps or a fellowship program as well

"We must continue to focus our efforts toward developing the next generation of environmental public health leaders—they are essential to the future of the public health infrastructure and more specifically to the health of our communities."
– Dr. Sharunda Buchanan
Branch Chief, Environmental Health Services
Centers for Disease Control and Prevention

as an Environmental Public Leadership Institute to accomplish this mission. Participants from federal, state, territorial, and local health departments and agencies and tribal governments would receive specialized training and applied experiences in environmental public health program management. These new leaders in environmental public health services would be expected to return to their workplaces and communities with the tools to institute change using the 10 essential services as a framework for a new organizational approach to the delivery of environmental public health services.

Following is the objective and its corresponding activities to foster strong leadership to enhance environmental public health services.

"Today the need for leaders is too great to leave their emergence to chance."

– Institute of Medicine, 1988

Objective III: Provide guidance, training, and assistance to state, territorial, and local health departments, tribal governments, and other stakeholders to specifically build and enhance leadership capabilities.

Activity III-1: Support national conferences, including videoconferences, to introduce CDC's environmental public health strategy to its stakeholders.

Activity III-2: Promote the use of CDC's Internet-based Environmental Public Health Listserv.*

Activity III-3: Develop environmental public health services guidance documents and recommendations and disseminate to stakeholders.

Activity III-4: Develop an Environmental Public Health Services Corps or a fellowship program to increase the number of highly trained professionals in the field of environmental public health services.

An Example of Training and Education

CDC hosted a Public Health Training Network satellite broadcast to provide information on (1) the need to improve and revitalize the nation's environmental public health services system and (2) CDC's strategy and activities to accomplish this task.

* The Environmental Public Health Listserv is an Internet-based information-sharing system. Any person with an interest in environmental public health services can join and interact. The listserv instructions address is www.cdc.gov/nceh/ehs/Listserv/ listserv.htm

Goal IV. Communicate and Market

Improve communication and information sharing among environmental public health agencies, communities, strategic partners, and other stakeholders and better market environmental public health services to policy makers and the public.

COMMUNICATING THE MESSAGE

New and re-emerging environmental hazards and threats and the growing complexity of related diseases have heightened public awareness of environmental issues. Unfortunately, people are unaware of (1) the federal, tribal, territorial, state and local programs that provide environmental public health services or (2) ways to access these services. People do not understand the role of environmental public health professionals in public health, and media coverage of significant public health concerns often fails to reinforce environmental public health priorities. A NACCHO study on the concerns of environmental public health practitioners concluded that, not surprisingly, major improvements in contemporary environmental public health can only be achieved through improved communication and marketing.[36]

As environmental public health services expand priorities from regulation to more comprehensive programs (i.e., lead poisoning, asthma, mold exposure, hazardous waste), prevention, rather than cures, have been emphasized.[26] Environmental public health practitioners list as their most important activities prevention communication, including education; media and public outreach; and marketing.[36] Traditional environmental public health problems and issues pertaining to water quality, food safety, indoor air quality, and toxic waste remain important. Increasingly, the acknowledged solution to these problems is public education.[25] Contemporary environmental public health educational priorities range from needing to teach the public about the safe use of household pesticides to training food service personnel to educating future environmental public health professionals.

One challenge in educating the public is to overcome its lack of information about environmental risks. Noting the discrepancy between public understanding of health risks and actual probabilities, Larry Gordon, former president of APHA, identified individual community risk assessment as one of 13 challenges to improve the environment for the next century.[37] NEHA identified both communication training and risk communication as important competencies for environmental public health professionals.[38]

Another major communication challenge is to help make the public and decisionmakers aware that the environmental health components of public health agencies are performing their jobs. One participant in the NACCHO study indicated the following:

> A successful environmental public health program becomes invisible. If environmental public health is done right, nobody takes notice. As a result, it's hard to gain support for more resources. The public only knows you're there when you are not doing your job well. When things are going well, policy makers think: "Well they don't need all that money, there are no public health problems there." If the budget is cut, then the public health problems result.[25]

Environmental public health units have tried various marketing strategies to gain recognition. According to the NACCHO study, the media often have created negative perceptions of environmental public health agencies and activities. News outlets focus audience attention to some issues over others. Reporters ignore many environmental public health priorities that

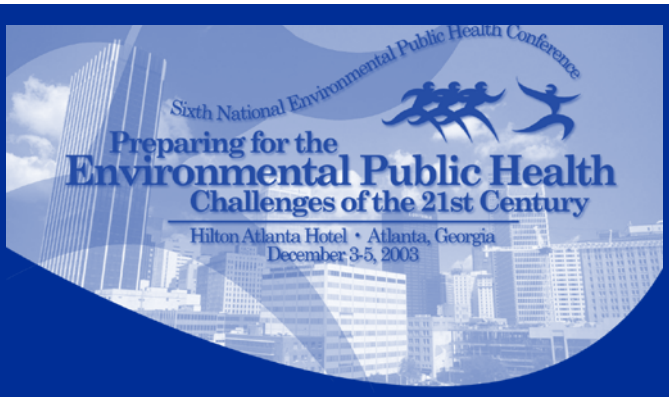
"We are all drowning in information, while starving for wisdom. The world henceforth will be run by synthesizers-people able to put together the right information at the right time, think critically about it, and make important choices wisely."

– Professor Edward O. Wilson

address prevalent problems and routine protection programs but instead often highlight unique, singular, and dramatic negative outcomes of environmental hazards.[39] As a result, reporters generally ignore environmental public health's most important work. Nevertheless, the media have the potential to facilitate positive images of environmental public health agencies and programs. Increased communication and marketing training for environmental public health practitioners is an important step in using the power of media to improve environmental public health.

Communicating Environmental Public Health

CDC participates in and sponsors national public health conferences to engage other agencies and organizations in developing national strategies to educate policy makers and others on environmental public health services.



The goal of environmental public health outreach, whether through marketing or the news media, is to give information to the public so people can make decisions. With information and resources, communities can play a role in protecting their environment and health. A prime example of community involvement and ownership of environmental public health issues is Delaware County, a central Ohio community of nearly 100,000 people.[40] Members of the community served on the *PACE-EH*[12] committee and defined the final environmental public issues on which the health department would focus and collect data regarding quality-of-life changes.

Community engagement should be a critical mission of environmental public health agencies. Participants in the NACCHO study listed "enhanced communication and work with local communities"[25] as the most important element leading to improved environmental public health. However, local involvement in environmental public health requires more than one-way communication. The National Research Council (NRC) concluded that involving community members at each step of risk assessment and management was necessary for ethical practice in public health.[41] NRC explains that people want a role in identifying environmental public priorities in their communities but often do not believe they have input in identifying problems and solutions that affect them. Involving the community requires a system that includes opportunities for community members to discuss their concerns and ideas with environmental public health professionals. Agency staff must listen to and understand individual and community concerns.

Increased appreciation for cultural differences was the second most important facilitating element for improved environmental public health in the NACCHO study. Several examples illustrate this issue. In New York City, when staff from the environmental public health unit investigated adults with toxic blood levels of lead they found all the adults were Asian who

received tea medications from a local herbalist. Further investigation revealed that the herbs came from Shanghai, China. Working together, the Shanghai and New York environmental public health units found that the herbs were dried in warehouses using car engine exhaust that contain leaded gasoline. Many of the people with the elevated blood levels refused to cooperate with the health department. Involvement of Chinese speaking personnel from the New York Department of Health persuaded many reluctant people to seek treatment for their lead poisoning.[42] Environmental public health professionals need to recognize and address the unique needs, beliefs, and practices of communities. *PACE-EH*[12] is an excellent tool to use in tackling this problem because it fosters collaboration among public health agencies and their communities to assess the environmental public health needs of the community.

Improved internal communication within the environmental public health service community is needed. Informational barriers among environmental public health professionals, especially in different agencies, have long prevented rapid sharing of outbreak and exposure information. Local agencies that seek resources for testing, training, or information often do not know where or how to access centralized databases or resources. Too often information does not flow smoothly to and from federal agencies to state and local professionals. Information about successful programs in one state is not routinely shared with other states because of a lack of centralized information systems. As *The Future of Public Health* explained,

> The infrastructure of environmental public health and protection is huge and complex, having evolved from public health agencies to multiple emerging environmental regulatory agencies. The consequences are fragmented responsibility, lack of coordination, and inadequate attention to the public health dimensions of environmental public health issues.[10]

Communication to create links within the environmental public health community and between environmental health and other public health agencies is necessary to improve public health. Federal, state, tribal, territorial, and local environmental public health service agencies need to communicate to establish priorities and share information to identify and prevent exposure and related diseases. In addition, environmental public health services stakeholders, especially at the community level, need to know how to avail themselves of training opportunities. All of this requires an improved system for communication among public health agencies, their partners, and communities.

The marketing of public health is a new concept and marketing of environmental public health is yet to be developed. Marketing is a highly developed field in the commercial world, but most public health agencies have neither the knowledge nor the trained personnel to conduct marketing effectively. As Siegel and Doner stated in *Marketing Public Health: Strategies to Promote Social Change*,

> Although marketing principles have been applied to some efforts to change health-related behaviors for many years, their application usually is restricted to initiatives that focus on the behavior of individuals and ignore the larger issues of policy changes needed to aid and support individual efforts. The integrating of marketing principles into day-to-day public health practice is a new concept and one that has not yet been fully developed. These principles can provide powerful tools for influencing all of the factors that contribute to social change: the individual, the environment, and social policy. [43]

Following are the objectives and their corresponding activities to improve communication and information sharing among environmental public health agencies, communities, and other stakeholders.

Objective IV-A: Identify and promote community-based strategies to elevate the image, importance, and need to improve environmental public health services.

Activity IV-A-1: Sponsor, support, and participate in national, regional, state, and local conferences and meetings pertaining to environmental public health services.

Activity IV-A-2: Engage national agencies and organizations in developing strategies and materials to educate the public policy makers and others on environmental public health issues.

Activity IV-A-3: Support the development and use of guidance documents to promote effective environmental public health services, such as *PACE-EH*.[12]

Objective IV-B: Support educational approaches and models of best practices to gain community support and participation in addressing environmental public health service issues, concerns, and best models to organize, deliver, and market environmental public health services.

Activity IV-B-1: Support activities and projects that demonstrate effective methods for interacting with environmental public health stakeholders.

Activity IV-B-2: Recommend and disseminate the best environmental public health service models to engage and empower local communities.

Activity IV-B-3: Support activities that demonstrate effective methods for marketing environmental public health services to policy makers and the public.

Goal V. Develop the Workforce

Promote the development of a competent and effective environmental public health services workforce.

BUILDING THE CORE OF ENVIRONMENTAL PUBLIC HEALTH PROFESSIONALS

In *Healthy People 2010*,[13] DHHS presented 17 public health infrastructure objectives, three of which were specifically directed toward developing the public health workforce. The report states,

> In addition to basic knowledge of public health, all public health workers should have competencies in their areas of specialty, interest, and responsibility . . . The workforce needs to know how to use information technology effectively for networking, communication, and access to information. A skilled workforce must be culturally and linguistically competent to understand the needs of and deliver services to select populations and to have sensitivity to diverse populations . . . Technical competency in such areas as biostatistics, environmental and occupational health, the social and behavioral aspects of health and disease, and the practice of prevention should be developed in the workforce.

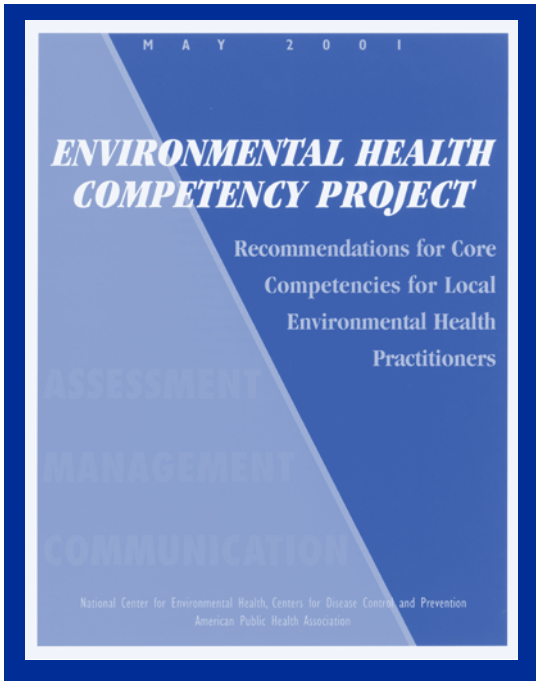
Ample evidence indicates that the environmental public health workforce is too small to meet its responsibilities. *Public Health Workforce: Enumeration 2000* states,

> The public health workforce in this current best estimate is composed of 448,254 persons supplemented by at least 2,864,825 volunteers. . . . It may come as a surprise that the current estimated number of public health workers is less than the oft-cited half-million number developed in the 1970s. At the time that number was developed, it represented a public health worker population ratio of one worker to each 457 persons, a ratio noticeably better than the current estimate of one worker for every 635 persons. Given the new public health challenges of the intervening decades, the change represents substantial erosion in public health capacity. There are at least 41 state environmental agencies responsible for environmental public health and protection programs, a number that far exceeds the number of environmental agencies included in data received for this report.[6]

The report estimates the environmental public health workforce to be 10% of the total public health workforce. Other reports have estimated the environmental public health workforce at 16%-21% of the total.[44] In addition, 46 different job classifications have been defined that provide environmental public health services (R. Marino, personal communication, October 7, 2000). Thus, as described in the *Public Health Workforce: Enumeration 2000*, "only 19,431 (out of 448,254) environmental public health professionals could be identified. This is likely due to the fact that many environmental public health activities are separated from other parts of public health."[6] The inadequate size of the environmental public health workforce can be traced to the increase in suburban populations and the consequent increase in the number of new homes requiring septic system inspections and approvals and to the explosion in the number of food establishments requiring inspection and monitoring.

The environmental public health workforce is engaged in a broad array of jobs. As the former president of APHA stated,

Environmental public health practitioners are involved not only in inspections, but perhaps more importantly in surveillance, warnings, permitting, grading, developing compliance schedules and variances, risk assessment, risk communication, public information, exposure evaluation, seeking injunctions and other legal remedies, embargoing, sampling for analyses, education, consultation, community networking, public information, problem prioritization, policy development, marketing the values and benefits of environmental public health, plan and design review and approval, and epidemiology. Such activities are essential to a modern, effective program. (L. Gordon, personal communication, November 30, 2001).



Box 4. Environmental Health Competency Project

Recommendations for Core Competencies for Local Environmental Public Health Practitioners

May 2001

Prepared by American Public Health Association and CDC's National Center for Environmental Health

The 14 core competencies for environmental health practitioners presented are based on the work of the expert panel at its February meeting and by subsequent revisions and comments. The competencies are grouped into the three primary functions of an environmental health program.

A. Assessment
- Information gathering
- Data analysis
- Evaluation

B. Management
- Problem solving
- Economic and political issues
- Organizational knowledge and behavior
- Project management
- Computer and information technology
- Reporting, documentation, and record keeping
- Collaboration

C. Communication
- Education
- Communication
- Conflict resolution
- Marketing

Note: Discussion about cultural sensitivity as a competency was extensive. All participants thought cultural sensitivity was important; although not an explicit competency, cultural sensitivity was considered to be part of environmental health and protection. Cultural sensitivity includes understanding the dynamics of cultural diversity (race, ethnicity, and socioeconomics), linking with other disciplines inside and outside the agency to enhance the receptivity of the workplace to a multicultural environment, acting with sensitivity and understanding, and developing and adapting approaches to problems that take into account cultural differences.

Special education or certification is not required for entry into the environmental public health workforce. Generally, a college degree is the stated minimal requirement, but many local health departments hire personnel with high school diplomas. No formal competencies define performance or direct training

approaches. A new worker learns by observing experienced environmental public health professionals. Pay scales in the public sector often are low, and as public health departments take on more environmental issues, rapid turnover of staff frequently occurs.

In 1998, the Robert Wood Johnson Foundation analyzed training needs for the public health workforce. Its report, *Preparing Currently Employed Public Health Environmental Professionals for Changes in the System*, describes the need for environmental public health practitioners to improve their knowledge and skills to competently perform the essential services of environmental public health and protection.[26] Skills required for communication, technical, management, and cross-cultural competencies represent an excellent basis for defining environmental public health competencies and translating them into training modalities. NEHA has prepared two sets of competencies[38] and the APHA, in conjunction with CDC, has prepared environmental public health competencies[45] (Box 4).

"The conventional definition of management is getting work done through people, but real management is developing people through work."

– Agha Hasan Abedi

Of historical interest is the *Seventh Report to the President and Congress on the Status of Health Personnel in the United States*.[5] This report stated that in 1980, 37,500 of an environmental public health workforce of 235,000 needed additional training in public health. This report also forecast a need for an additional 137,000 environmental public health professionals. Accredited environmental public programs are designed to provide their graduates with a foundation in environmental sciences and public health while developing their critical thinking skills. Only 23 such undergraduate programs are accredited by the National Environmental Health Science and Protection Accreditation Council. Colleges probably would have more environmental public health programs if students demanded them, but without adequate workplace compensation, few students want to enter the field. Clearly, these programs alone cannot meet the demand for the environmental public health and protection workforce needed to address the issues described above. As the *Report to the President and Congress* stated,

> The potential consequences of an inadequately staffed and trained workforce are worrisome. Few national resources are committed to preparing future environmental public health and protection professionals; training opportunities for members of the existing workforce are limited; and opportunities for local workers to upgrade their environmental public health knowledge are not readily available. Thus, the number of graduates from accredited programs in environmental public health and training opportunities for current environmental public health professionals, particularly at the local level, both need to increase.[27]

In 1996, only 18 states required formal registration of environmental health specialists or sanitarians. Sixteen states had no registration, and 16 others had only voluntary registration. Standards often are minimal. If the environmental public health workforce is to be truly effective, minimum competency levels must be defined, and people who practice in this field must be encouraged or perhaps required to meet those levels. Well-trained, competent professionals are more likely to be recognized as local authorities and leaders in public health.

Much work has been accomplished with limited resources in defining competencies, creating an Internet-based training registration system, and funding 31 "Centers for Public Health Preparedness" (19 academic centers, seven specialty centers, and five advanced practice centers) at schools of public health and local health department-based training centers.[8] In May 2001, CDC and ATSDR, together with partners from the public health practice and academic communities, produced a global workforce development plan[46] that envisions the following continuum: monitoring workforce composition, identifying competencies and developing curricula, designing integrated learning systems, using incentives to ensure competency, conducting evaluation and research, and ensuring financial support.

Both Frist-Kennedy bills—the Public Health Threats and Emergencies Act of 2000 (P.L. 106-505) and the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 (P.L. 107-188)—focus on bioterrorism and new and re-emerging infections. In addition, the Public Health Threats and Emergencies Act of 2000, Section 101, emphasizes improving core health capacity within the public health system. The laws have broad support, especially with the current focus on public health preparedness and response capability. These laws are expected to add critically needed resources for training and core public health capacity building.

Developing the Workforce

CDC plans to enhance and increase the number of highly trained professionals in environmental public health services by developing an Environmental Public Health Services Corps or fellowship program.

Development of a competent workforce has been an ongoing theme throughout the history of public health. An editorial in the *Journal of the American Medical Association* states,

> There has probably never been a time in the history of this country when trained, competent, and efficient health officers were needed as much as they are now. It is unfortunate that in the absence of epidemics too little attention is paid to those whose duties require them to guard the public health.[47]

This editorial was printed in 1893 but is as timely today as when first published.

Following is the objective and its corresponding activities to promote the development of a competent and effective environmental public health services workforce.

Objective V: Provide support to develop the environmental public health service workforce by enumeration, performance standards, training, recruitment, and retention activities.

Activity V-1: Enumerate the environmental public health service workforce.

Activity V-2: Define environmental public health services performance standards.

Activity V-3: Define the training and continuing education needs of the environmental public health service workforce.

Activity V-4: Expand efforts to improve the recruitment and retention of competent and effective practitioners in the field of environmental public health services, with special emphasis on the recruitment and retention of minorities.

Goal VI. Create Strategic Partnerships

Foster interactions among agencies, organizations, and interests that influence environmental public health services.

SHARING INFORMATION

Interactions among environmental public health professionals, agencies, and organizations can range from networking to partnering. In speaking about public health, Siegel and Doner stated,

> Working with organizations is an important part of most social change efforts. Building and maintaining effective relationships with other organizations often is critical to achieving desired outcomes. 'Partners' can include cosponsors of programs, the media, and a variety of intermediaries that are used to reach target audiences . . . Partners are often necessary to successfully bring about change. They can provide additional resources, additional reach to audience members, greater credibility with their constituencies, and expertise that your organization does not possess . . . but building strong partnerships takes time and involves compromise.[43]

NACCHO and its partners have produced a tool, *Mobilizing for Action Through Planning and Partnership (MAPP).*[48] Using *MAPP*, communities can accomplish four strategic assessments focused on community themes, local public health system assessment, community health assessment, and evaluation of the forces of change. Environmental public health issues are one of the critical parameters in *MAPP*.

Environmental public health professionals also must recognize that the communities they serve are critical partners. *PACE-EH*,[12] assists public health agencies and the communities they serve in collaborating on assessments of environmental public health needs and developing strategies to address them. Delaware County, Ohio, provides one example of community involvement and ownership.[40] The community members of the *PACE-EH* committee were instrumental in defining the issues, then working with health department committee members to define the high-priority issues. While there have been many examples of successful partnerships, the need to build and expand strategic partnerships in environmental public health services remains significant. This is especially needed in forging partnerships with legislative and policy-making groups, boards of health, governing bodies of local jurisdictions, land-use planning boards and organizations, and the media.

Following is the objective and its corresponding activities to foster interactions among agencies, organizations, and interests that influence environmental public health services.

Objective VI: Coordinate and promote activities that identify critical stakeholders, and foster communication and interaction among agencies, organizations, and interests that influence environmental public health services.

Activity VI-AI-1: Identify stakeholders who influence all components of the environment (built and natural) that have an impact on environmental public health services.

Activity VI-AI-2: Support activities (e.g., conferences, meetings, seminars, etc.) that influence stakeholders to work together to improve environmental public health.

Activity VI-AI-3: Develop mechanisms for regular communication and coordination among stakeholders.

Anticipated Outcomes

Environmental public health . . . touching everyone's life every day.

The overarching goal of this strategy is to enhance and revitalize environmental public health services to address the broad range of environmental public health issues facing the nation. Revitalization could motivate talented people to enter the field, which is the second largest component of the public health workforce. Improving the environmental public health services practitioner's access to technology and other innovative tools also should increase the ability to achieve the goals, objectives, and activities of this strategy. The outcome will be a stronger, more flexible environmental public health services workforce that has a solid infrastructure and that is well prepared to respond to environmental public health issues and to address the unexpected.

SPECIFIC ANTICIPATED OUTCOMES

- Significant increase in environmental public health services capacity at the state, tribal, territorial, and local levels
- Improved drinking water safety from an improved understanding of how to protect unregulated or under-regulated water supplies
- Enhanced ability of the environmental public health services workforce to address existing and emerging needs and to identify environmental antecedents of disease outbreaks
- Enhanced ability of state, tribal, territorial, and local programs to anticipate, recognize, and respond to environmental threats
- Emphasis on the prevention aspect of environmental public health services
- More effective use of data analysis by frontline environmental public health practitioners to respond to environmentally related illness
- Stronger working relationships among the stakeholders in environmental public health services
- Implementation of effective public health programs as a result of effective involvement of the affected communities
- Empowerment of communities engaged in environmental public health issues
- Better understanding of the scope of work, size, composition, performance standards, and competencies of the environmental public health workforce and its leadership
- Increase in the number of environmental public health practitioners who engage in competency-driven continuing education and training
- Creation of a National Environmental Public Health Services Corps or fellowship program comprising well-trained specialists destined to become leaders in environmental public health services delivery
- Development of an Environmental Public Health Leadership Institute that educates mid-career environmental public health managers regarding best practices

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Acronyms

ASTHO	**Association of State and Territorial Health Officials**
ATSDR	**Agency for Toxic Substances and Disease Registry**
APHA	**American Public Health Association**
CDC	**Centers for Disease Control and Prevention**
DHHS	**Department of Health and Human Services**
HUD	**Department of Housing and Urban Development**
EEHS	**Emergency and Environmental Health Services**
EPA	**U.S. Environmental Protection Agency**
IOM	**Institute of Medicine**
MAPP	**Mobilizing for Action through Planning and Partnership**
NACCHO	**National Association of County and City Health Officials**
NALBOH	**National Association of Local Boards of Health**
NCEH	**National Center for Environmental Health**
NCID	**National Center for Infectious Diseases**
NEHA	**National Environmental Health Association**
NRC	**National Research Council**
PACE-EH	**Protocol for Assessing Community Excellence in Environmental Health**
WHO	**World Health Organization**

Glossary

Animal control: An activity to prevent the transmission of zoonotic diseases and injury caused by animals and their bites, to alleviate animal nuisances, or to enforce animal control ordinances.

Antecedent: Preceding event, condition, or cause.

Assessment: One of the three core functions of public health. Comprises monitoring, diagnosis, and investigation; the "science" of public health.

Assurance: One of the three core functions of public health. Comprises enforcement, guaranteeing the delivery of health services, and evaluation; the "art" of public health.

Biomonitoring: "Biologic monitoring." Testing of the environment or people for biologic agent exposure.

Brownfields: Old commercial facilities that contain minimal hazardous materials and that are converted for residential or clean commercial use.

Built and natural environments: The total environment.

***Campylobacter*:** Gram-negative, spirally curved, rod-shaped bacterium; family Spirillaceae.

Capacity building: Providing the framework and resources to develop structure within health departments to systematically address traditional as well as contemporary and emerging environmental public health services issues, problems, and concerns utilizing the *Ten Essential Public Health Services.*

Competencies: Skills, behaviors, and actions necessary to perform a job.

***Core Public Health Functions*:** The document produced by the National Association of County and City Health Officials that lays out the three core functions (assessment, assurance, and policy development) and the essential public health services.

***Cryptosporidium*:** An intestinal coccidian protozoa which, when found in drinking water, can cause diarrhea.

***Escherichia coli* O157:H7:** A gram-negative colon bacillus; O157:H7 is enterohemorrhagic.

Environmental public health: The art and science of protecting humans against environmental factors that can adversely affect health or the ecologic balances essential to long-term health and environmental quality. Such factors include air, food, and water contaminants; radiation; toxic chemicals; disease vectors; safety hazards; and habitat alterations. According to the World Health Organization and *Healthy People 2010*, "environmental health comprises those aspects of human health, disease, and injury that are determined or influenced by factors in the environment."

Environmental protection quality: Activities controlled by regulation, such as air and water safety.

Essential public health services: Ten public health services that are deemed to be the critical activities of public health.

Frist-Kennedy bill: A public health infrastructure development bill. Now called the Public Health Threats and Emergencies Act of 2000. Public Law 106-505, Section 101.

***The Future of Public Health*:** Document published in 1988 by the Institute of Medicine that reviewed the poor status of public health in the United States and defined measures to improve the system.

Global threats: Threats to the environment and people that transcend borders, e.g., global warming, terrorism.

Hantaviruses: Viruses of the family Bunyaviridae; can cause hemorrhagic fever with renal syndrome and hantavirus pulmonary syndrome.

***Healthy People 2010*:** The health objectives to be accomplished by the year 2010; promulgated by the U.S. Department of Health and Human Services. The goal is to eliminate the gaps in health status among racial and ethnic groups.

Lyme disease: An acute inflammatory disease that is caused by a spirochete (*Borrelia burgdorferi*) and transmitted by ticks (genus *Ixodes* and especially *I. dammini*); often characterized initially by a spreading red, ring-shaped skin lesion at the site of the infection and by fever and chills; may result in joint pain, arthritis, cardiac disorders, or neurological disorders.

***Mobilizing for Action Through Planning and Partnership (MAPP)*:** A process developed under the auspices of the National Association of County and City Health Officials to improve community health.

Pew report: *America's Environmental Health Gap*, produced under the auspices of the Pew Environmental Health Commission.

***Pfiesteria piscicida*:** A marine microorganism that releases a toxin that can cause massive fish kills.

Policy development: One of the three core functions of public health. Policy development comprises education, mobilization, and development of plans; the "politics" of public health.

Prevention communication: Messages to the public about how to reduce risk for adverse health effects from exposure to disease-causing agents and chemicals.

***Protocol for Assessing Community Excellence in Environmental Health (PACE-EH)*:** A community-based process for evaluating and prioritizing local neighborhood environmental issues facing a neighborhood.

Public health: The art and science dealing with the protection and improvement of community health by organized community effort and including preventive medicine and sanitary and social science.

Risk assessment: System to evaluate the potential or actual exposure to a biologic or environmental agent.

Stakeholder: Person or organization with an interest in an environmental public health services system.

Stovepipe: Programs that work in isolation.

Strategic partnership: The close-working relationship among affected organizations to ensure the success of an endeavor.

Systems management: A scheme for operating an organization with rules and precepts.

Terrorism: A catch-all phrase that includes all forms of the systematic use of terror, especially as a means of coercion: includes biologic, electronic (computer network destruction), nuclear, incendiary, chemical, explosive, and radiation terrorism.

Urban sprawl: The growth of urban populations to large suburban areas.

Vector: A carrier (usually an insect, arthropod, or rodent) that transmits the causative organism of disease.

***Vibrio cholerae*:** Gram-negative rod bacterium that produces an enterotoxin, causing a severe diarrheal disease (e.g., cholera).

West Nile virus: A virus transmitted that is by mosquitoes and that causes encephalitis. Mosquitoes acquire the virus from birds and can transmit it to animals (e.g., horses) and people.

Yellow fever: An acute infectious viral disease. The virus can be transmitted by the bite from a mosquito or primate.

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