— Second in a Series —

The Future of Environmental Health

— Part One —

Introduction

Many of the environmental health and protection issues associated with the modern environment of our nation and the world continue to become increasingly complex, and some may be intractable.

The causes of environmental degradation are manifold, but include population growth, resource consumption and disposal, and urbanization. The environmental problems impact human health as well as ecological relationships, and they are closely interwoven. The ecological maxim that "everything is connected to everything else" becomes more apparent every day.

Solutions to our environmental ills are as complex as the causes, and opinions as to solutions are as varied as opinions regarding their nature and causes.

However, solutions are increasingly dependent on certain basic considerations. These include a properly informed citizenry; a sound economy; continuing basic and applied environmental health and protection research to define problems as well as to design control measures; data essential to measuring effort and understanding trends; properly designed and targeted environmental policies and requirements; the provision of adequate resources focused on risk as identified by sound epidemiology, toxicology, and risk assessment; societal mechanisms and agencies having missions of protecting the environment and humans as a part of the environment; and, basic to all the foregoing, a professional environmental health and protection work force.

The purpose of this report is to discuss the factors that ultimately determine the level of environmental health and protection afforded the population and the environment. This report is designed to identify issues, provoke discussion, and provide recommendations to address many of these issues.

Acknowledgment

This document is the product of the work of scores of environmental health and protection practitioners and academicians representing a wide variety of agencies and institutions throughout the U.S. Each draft of the document was widely circulated for review, editing, recommendations and criticism.

The document was envisioned by Leonard Rice, 1992 president of the National Environmental Health Association. Early in 1992, President Rice appointed the NEHA Committee on the Future of Environmental Health. Committee members included:

- **Trenton Davis**, Dr.P.H.
  Associate Dean
  School of Allied Health Sciences
  East Carolina University
  Greenville, North Carolina
- **Robert Powitz**, Ph.D., Director
  Environmental Health and Safety
  Wayne State University
  Detroit, Michigan
- **Richard Roberts**, M.P.H.
  Environmental Management
  Consultant
  Grover City, California
- **Capt. Barry Stern**, M.P.H.
  U.S. Public Health Service
  Rockville, Maryland
- **Charles Treser**, M.P.H.
  School of Public Health
  University of Washington
  Seattle, Washington
- **Chris Wiant**, M.A., M.P.H.
  Director of Environmental Health
  Tri-County Health Department
  Englewood, Colorado
- **Larry Gordon**, M.S., M.P.H., Chair
  Visiting Professor
  of Public Administration
  University of New Mexico
  Albuquerque, New Mexico

What is environmental health and protection?

Environmental health and protection refers to protection against environmental factors that may adversely impact human health or the ecological balances essential to long term human health and environmental quality, whether in the natural or human-made environment. These factors include but are not limited to air, food and water contaminants, radiation, toxic chemicals, wastes, disease vectors, safety hazards and habitat alterations.

Current concern

Concern for the quality of our environment and related public health implications has never been more intense. Political leaders and ordinary citizens, whether liberal, moderate or conservative, express concern over the quality of our environment, as well as the need for professional environmental health and protection leadership.

The U.S. does not have an environmental health and protection system, but has a confusing patchwork of often overlapping and competing agencies having different and sometimes conflicting missions and divergent priorities. This is also relevant in the design, assignment of authority and implementation of preventive programs, particularly at the state and local levels. Not only is this non-system is costly; it also leads to confusion, inefficiency and ineffectiveness. Although it may be the product of a democratic society, the problem of environmental health and protection is sufficiently large and complex to warrant an evaluation of the current non-system to determine what improvements and efficiencies might be appropriate to provide a greater level of protection for the environment and human health.

Large sums are being spent by the public and private sectors to solve environmental problems, but inadequate attention is being given to preventing those problems. There is widespread disagreement and confusion regarding environmental health and protection priorities, goals and resources, as well as difficulty in defining acceptable risk. In addition, it is frequently not clear which agency or level of government has responsibility for designing and implementing programs.

The absence of a comprehensive, coordinated system to provide environmental health and protection services suggests that it might be impossible to properly balance risks with resources allocated to address those risks.

Risk and priorities

Environmental health and protection continues to be a matter of local, national and global discussion and debate. Globally, priority issues include species extinction, possible global warming, stratospheric ozone depletion, wastes, desertification, deforestation, planetary toxification and (most importantly) overpopulation. Excessive population contributes to all the foregoing as well as to famine, war, disease, social disruptions, economic woes, and resource and energy shortages.

A 1990 Roper poll found that, in terms of public perception, at least 20 percent of the U.S. public considered hazardous waste sites to be the most significant environmental issue.

But contrary to public perception, the 1990 report of the U.S. Environmental Protection Agency's (EPA) Science Advisory Board, *Reducing Risk: Setting Priorities and Strategies for Environmental Protection*, lists ambient air pollutants, worker exposure to chemicals, indoor pollution and drinking water pollutants as the major risks to human health. Childhood lead poisoning and food protection are not EPA programs, but should be added to any list of priorities impacting human health.

EPA's *Reducing Risk* also states that:

"...there is no doubt that over time the quality of human life declines as the quality of natural ecosystems declines... over the past 20 years and especially over the past decade, EPA has paid too little attention to natural ecosystems. The Agency has considered the protection of public health to be its primary mission, and it has been less concerned about risks posed to ecosystems... EPA's response to human health risks as compared to ecological risks is inappropriate, because, in the real world, there is little distinction between the two. Over the long term, ecological degradation either directly or indirectly degrades human health and the economy... human health and welfare ultimately rely upon the life support systems and natural resources provided by healthy ecosystems."

As risks to the natural ecology and human welfare, *Reducing Risk* listed habitat alteration and destruction; species extinction and overall loss of biological diversity; stratospheric ozone depletion; global climate change; herbicides/pesticides; toxics, nutrients, biochemical oxygen demand and turbidity in surface waters; acid deposition and airborne toxics. Among relatively low risks to the natural ecology and human welfare, the list also included oil spills, groundwater pollution, radionuclides, acid runoff to surface waters and thermal pollution.

A December 1991 survey conducted by the Institute for Regulatory Policy of nearly 1,300 health professionals in the fields of epidemiology, toxicology, medicine and other health sciences entitled *The Health Scientist Survey: Identifying Consensus on Assessing Human Health Risk*, indicated that:

"Over eighty-one percent (81%) of the professionals surveyed believe that public health dollars for reduction of environmental health risks in the United States are improperly targeted."

Taking all of this into consideration, it must be emphasized that the issue of how risk is identified, assessed, defined, understood, prioritized, communicated and managed, and the manner in which perception, emotion and hysteria are handled, is itself among the most critical environmental problems of today and tomorrow. Resources can best be allocated to address actual and significant risks, yet public perception often drives the response of elected officials and public agencies. Environmental health and protection professionals usually have greater expertise in the technical program issues than in the realm of assessment, hazard analysis, epidemiology, prioritization, economics, communication, management and public policy. Further, it is necessary to recognize the misuse or absence of science in an effort to justify a position or alarm the public.

Environmental health and protection personnel should specifically:

- Recognize that the media frequently are conduits for an abundance of misinformation and a shortage of critical scientific inquiry behind many of the "catastrophe of the week" issues.
- Recognize that if all of the alleged

environmental catastrophes were scientifically factual, we would have many times the morbidity and mortality rates than we actually have. The interests served by numerical exaggeration include those entities whose funding or political importance varies with the hysteria surrounding a particular issue. Environmental health and protection personnel and agencies must refute scare stories which are not based on sound epidemiology, toxicology and risk assessment.

- Question reports which base a problem on finding one anecdotal example; e.g., one cancer patient near a hazardous waste site, that capitalizes on appeal to the emotions. Epidemiologists term this the "I know a person who..." syndrome.
- Beware of individuals and organizations who use "science" to front and further their organizational and political objectives. Peer-reviewed science does not depend on media manipulation, Hollywood personalities or slick public relations.
- Beware of "predicted" morbidity and mortality figures pulled out of the air by self-styled "experts".
- Be scientifically critical. Too many self-proclaimed "professionals" are actually only regulators or functionaries, ever ready to accept, promote and enforce the current party line or misinformation. Examples of environmental extremism surround the issues of radon, asbestos removal, alar, below regulatory concern (BRC) disposal of low level radioactive wastes, and the Waste Isolation Pilot Project.
- Be wary of accepting problems based only on extrapolations and correlations rather than on good epidemiological and toxicological cause-and-effect studies. The science of epidemiology attempts to sort out from myriad chance correlations those meaningful ones which might involve cause and effect. It is important to understand, however, that epidemiological methods are inherently difficult and that it is not easy to obtain convincing evidence. There are also many sources of bias. For example, because there are so many different types of disease, by chance alone one or more of them may occur at a higher frequency in any given small population. The science of toxicology provides evidence as to whether correlation is credible.
- Recognize that there may be a difference between science based facts and public perception.
- Learn and practice the art of risk communication on the level at which your audience is listening. Few environmental health and protection professionals understand and practice effective risk communication. Instead, risk communication is considered to be a speech, a press release or a leaflet. This is one of the precursors of the fact that public perception of risk is at variance with that of scientists.
- Always question, challenge, investigate alternative solutions, and analyze existing and proposed regulations and standards to determine the validity of their scientific base. Existing programs, standards and regulations tend to be magical and take on a life of their own. They are seldom challenged. A standard in motion tends to remain in motion unless impeded by an equal and opposite force. Environmental health and protection professionals should provide the scientific "equal and opposite force" to challenge the prevailing understanding of risk.
- Place a high value on scientific excellence when developing public policy.
- Remember that many people tend to overestimate risk from rare but dramatic events. They also tend to underestimate events such as unintentional injuries and deaths, and the slow homicide and suicide caused by tobacco. Some disdain changing preconceived notions about risks and priorities, and may be quick to dismiss evidence as erroneous or biased if the information contradicts their opinions.
- Understand that many Americans, and even some environmental practitioners, seem to exhibit a fascination with calamity. Some extremists are applauded and profit from false predictions of environmental calamity, some of which become translated into public hysteria and public perception, thence into political action, and finally into expensive and unnecessary programs and public policy. Those promoting such hysteria accept no responsibility for their false statements and predictions.
- Understand the problem before proposing a solution, and fit the solution to the problem rather than the problem to the solution.
- Realize that the proper standard for environmental health and safety is not "zero risk" but "net societal benefit". Zero-risk may not be economically or practically attainable, and the cost of pursuing zero-risk for one particular issue may preclude resources essential for addressing more important problems.
- Understand that an unnecessary, poorly designed or overly expensive program becomes even more difficult to stop or alter once a bureaucracy or an industry is developed to promote the program. The issues of asbestos removal and radon detection and management provide excellent examples.
- Utilize the environmental health and protection model in the decision making process for environmental health and protection issues, rather than the medical model. The former looks at the community, nation or planet as the patient and, in principle, allocates resources to maximize health and environmental quality for all. The latter, once a pathology is diagnosed, provides everything possible to cure the pathology without regard to resources, priorities or effects beyond that one particular patient.

The primacy of prevention

While the field of environmental health and protection identifies with prevention, a preponderance of effort is currently devoted to cleaning up problems created as a result of earlier actions taken by the public and/or private sectors. For the most part, environmental health and protection personnel are neither adequately trained to be involved nor effectively involved during the planning and design stages of energy production and alternatives, land use, transportation methodologies, facilities construction, resource utilization, and product design and development activities.

EPA's *Reducing Risk* states:

"...end-of-pipe and waste disposal should be the last line of environmental defense, not the front line. Preventing pollution at its source through the redesign of production processes, the substitution of less toxic production processes, the screening of new chemicals and technologies before they are introduced into commerce, energy and water conservation, the development of less-polluting transportation systems and farming practices, etc., is usually a far cheaper, more effective way to reduce environmental risk, especially over

the long term."

"More widespread use of pollution prevention techniques holds enormous environmental and economic promise for a number of reasons. For one thing, some environmental problems like global warming, simply cannot be remediated in any practical way using only end-of-pipe controls.

"Pollution prevention also minimizes environmental problems that are caused through a variety of exposures. For example, substituting a non-toxic for a toxic agent reduces exposures to workers producing and using the agent at the same time as it reduces exposure through surface water, groundwater, and the air.

"Pollution prevention also is preferable to end-of-pipe controls that often cause environmental problems of their own. Air pollutants captured in industrial smokestacks and deposited in landfills can contribute to groundwater pollution; stripping toxic chemicals out of groundwater, and combusting solid and hazardous wastes, can contribute to pollution. Pollution prevention techniques are especially promising because they do not move pollutants from one environmental medium to another, as is often the case with end-of-pipe controls. Rather, the pollutants are not generated in the first place..."

Environmental policy must be based on prevention if there is to be any hope of preventing further resource depletion, ecological destruction and minimizing the health impacts of environmental contaminants. The Superfund Program has demonstrated that the complexity and cost of cleanup is well beyond current technology and resources. Current regulatory programs must incorporate incentives for pollution prevention as a means of complying with the intent and specific requirements of environmental laws.

Organizations and program scope

There are many agencies which administer environmental health and protection programs at all levels of government. There is no standard model for environmental health and protection programs. Every level of government has numerous agencies with environmental health and protection responsibilities. Three prominent models are health departments, "little EPAs," and superagencies. Often responsibilities are distributed among these agencies.

At the federal level, these agencies include the Environmental Protection Agency, the Occupational Safety and Health Administration, the U.S. Public Health Service (including the National Institute of Environmental Health Sciences, the Centers for Disease Control, the Indian Health Service, the Food and Drug Administration, and the Agency for Toxic Substances and Disease Registry), the National Institute for Environmental Health and Safety, the Coast Guard, the Geological Survey, the National Oceanographic and Atmospheric Administration, the Fish and Wildlife Service, the National Marine Fisheries Service, the Nuclear Regulatory Commission, the Corps of Engineers; and the Departments of Transportation, Agriculture, and Housing and Urban Development. Major departments administering proprietary programs include Defense, Energy and Interior.

Environmental health and protection programs are typically components of local health departments. However, a number of jurisdictions in the western U.S. have established separate environmental health or environmental management departments. Environmental health and protection activities are also located in such local agencies as public works, housing, planning, solid waste management, special purpose districts, regional authorities, etc.

These organizational changes occur for a variety of reasons, including political perception of the importance of the environment, demands on environmental advocacy groups, political responsiveness of the agencies, and differences regarding program emphasis and priorities in existing health departments.

The trend to organizationally separate environmental health and protection agencies from health department programs will continue in response to the demands of environmental advocates, and in response to many health departments becoming substantially involved in health care issues. It is unrealistic to develop programmatic relationships between water pollution control, for example, and any one of a number of treatment and rehabilitation programs (health care). Further, the drift of federal, state and local health departments toward more and more health care (as providers of last resort) translates into less and less leadership for environmental health within such health departments. The movement of environmental health and protection programs away from health departments is a part of our evolving governmental system. However, there is a need to evaluate the balance of authority and responsibility between the federal, state and local environmental health and protection agencies. There is further need to unify environmental health and protection programs, if not in the same agency, then through improved interagency coordination. Health department-based environmental health professionals have often exhibited a preference for the traditional programs of food protection, liquid waste disposal, solid waste management and vector control. In spite of public demand for local agency involvement in air, land and water pollution programs there often appears to be a reluctance to acquire the necessary skills and resources to participate in some of what are often referred to as the environmental protection programs.

Considering the organizational changes occurring, we must evaluate whether the public and the environment may be served as well or better by environmental health and protection agencies separate from health *care* organizations. The changes presage the creation of more EPAs, as environmental constituents, both citizen and political, find it impossible to identify with the health care character of many health departments.

No matter the titles or organizational arrangement, to be effective, the lead agencies for environmental health and protection should be comprehensive in programmatic scope; staffed by personnel having the requisite competencies and leadership skills (Sections XIII and XIV); have program design and priorities based on sound epidemiology, toxicology and risk assessment data; and have adequate analytical, data, legal and fiscal resources.

Environmental personnel who identify only with traditional health departments may be an endangered species eking out an existence in a constantly shrinking organizational environment. As separate environmental health and protection organizations are created, every effort also should be made to ensure that *all* environmental

health and protection programs are transferred, so as not to further fragment the environmental health and protection effort itself. Many misguided jurisdictions have rationalized that such programs as food, water supply, and liquid wastes are "health," while air, water pollution and waste programs are not "health." In fact, all such programs have a health goal, are based on health standards, and would not exist except for their health implications. All such programs should be prioritized together. All require the same type of program methods, laboratory support, legal resources, epidemiology, prioritization, risk assessment, risk communication, risk management, surveillance and data.

It must be noted, however, that environmental health and protection programs are faced with a serious and damaging conflict of interest when they are organizationally included in agencies which also have a mission of resource utilization or exploitation and development.

Industry has learned that products and services must be continuously redesigned and repackaged in order to compete and survive. Environmental health and protection personnel must follow the example of the private sector and redesign, repackage and re-title their products (programs) when appropriate for effective marketing, public service, and protection of public health and the environment.

Lack of data

The data profiling state health agencies, collected and published by the Public Health Foundation (PHF) are incomplete and thereby misleading for environmental health and protection throughout the nation. The PHF's annual questionnaire is distributed to a designated "state health official" in each state, while not addressing the need for data from other environmental health and protection agencies. These PHF data include only those environmental health and protection activities under the purview of the designated "state health official."

Inasmuch as there are more environmental health and protection activities outside than within the scope of each "state health official," there is no comprehensive national data collection effort for environmental health and protection. Accurate, comprehensive reporting would portray a many-fold increase in environmental health and protection activities beyond that reported by the PHF, thereby indicating a radically higher percentage of effort and emphasis on environmental health and protection as compared with other reported health services.

The National Association of County Health Officials (NACHO) also has surveyed local health departments to identify the nature of the environmental work force and programs at the local level. The U.S. Public Health Service Bureau of Health Professions has sponsored several studies to further profile the environmental health work force. In each case there has been significant uncertainty as to what proportion of the work force was represented in the data collected.

There is no known comprehensive state and local listing of the various environmental health and protection agencies and their specific responsibilities. The organizations vary widely from state to state, both in titles and scope of services.

Another data shortfall is in health and environmental status information. This includes morbidity and mortality data, occurrence data of different chemical contaminants in the environment, and health effects data from the exposure to those contaminants.

A solution to data needs in environmental health and protection can be found through additional resources, new technology (i.e., for health effects research) and improved measures of health status. However, until data needs are met, there will continue to be confusion, misunderstanding and differences between perception and reality that cannot be easily resolved.

The lack of a nationwide, comprehensive data collection system is a critical problem.

Relating and networking

Environmental health and protection programs are most effective when continuing institutionalized relationships are insured, not only with other environmental health and protection agencies and groups, but also with those involved in activities which relate to the quality of the environment.

This is particularly relevant in the coordination of such activities as land use, energy production, transportation, resource development and utilization, agriculture, conservation, engineering, design, education, public health, product design and development, and economic development.

Environmental health and protection personnel must recognize the key role that they should play in the planning and development phase of these activities to ensure that health and environmental protection issues have been adequately observed.

Environmental health and protection personnel must improve communication with and, as appropriate, join forces with all the various environmental groups and agencies.

Access to services

Every citizen of our nation requires the benefits of effective environmental health and protection services, whether at home, work, play, in institutions, or while traveling. This assures freedom from environmental factors which adversely affect human health, safety, comfort and well-being, or which damage delicate ecological relationships or the economy upon which positive health depends. Every individual must have protection from such factors as toxic chemicals, polluted air and water, unsafe drinking water, unintentional injuries, unsafe food, excessive radiation exposure, solid wastes, hazardous wastes, vector-borne diseases, inadequate shelter, and global environmental health and protection problems. Access to these services is essential to ensure an acceptable quality of life for the inhabitants of this planet.

Such access will not be effective without the full involvement of adequate numbers of properly educated and experienced professionals possessing a working knowledge of the various technical and scientific areas, as well as epidemiology, risk assessment, problem prioritization, toxicology, biostatistics, environmental economics, cost-benefit of programs, risk communication, and public policy development and implementation.

Watch for Part II of "The Future of Environmental Health" in the March 1993 issue of the *Journal of Environmental Health.*

