EDUCATING

Environmental Health
Science & Protection
Professionals

Problems, Challenges
& Recommendations

U.S. DEPARTMENT OF
HEALTH & HUMAN SERVICES
Public Health Service
Health Resources and Services Administration
EDUCATING

Environmental Health Science & Protection Professionals

Problems, Challenges & Recommendations

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&

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ACKNOWLEDGMENT

Recognizing the need to significantly improve the knowledge, skills, and effectiveness of the environmental health science and protection work force, the Bureau of Health Professions (BHPr) contracted with the Association of Schools of Public Health and enlisted the aid of Professor Larry Gordon to develop this report -- "Educating Environmental Health Science and Protection Professionals: Problems, Challenges, and Recommendations." Larry Gordon, retired New Mexico Cabinet Secretary for Health and Environment and a former President of the American Public Health Association, is currently Visiting Professor of Public Administration of the University of New Mexico.

Captain Barry Stern, BHPr, conceived this project and worked very closely with Larry Gordon throughout the development of this document.

It is intended that this report be appropriately distributed so that it may be widely discussed and debated as a major step in improving training and education for the nation's environmental health science and protection work force.
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PURPOSE

This plan provides policy discussions and recommendations to effectively address serious deficits in the quality and quantity of our Nation's environmental health science and protection workforce. The field of environmental health science and protection is as diverse as are the professionals involved. Current and future challenges require education and training designed to develop professionals possessing essential scientific, political, communication, managerial, and leadership knowledge and skills necessary to protect human health and prevent further degradation of delicate ecological systems.

EXECUTIVE SUMMARY

CHALLENGES

The greatest challenges currently facing the environmental health science and protection workforce include:

— Inadequate emphasis on prevention, as opposed to curative efforts and clean-up. (See p.13)

While the field of environmental health science and protection involves a perception and identification with prevention, a preponderance of effort is devoted to cleaning up problems created as a result of earlier decisions and actions taken by the public and private sectors. Environmental health science and protection personnel must become effectively involved during the planning and design stages of energy production and alternatives, land-use, transportation methodologies, resource utilization, and of product development which may have a negative impact on human health or the environment.
— Inadequate ability to constructively and effectively impact the process of public policy development, implementation, and constituency development. (IOM Report, see p. 23)

— Inadequate managerial and organizational behavior skills. (IOM Report, see p. 32)

— Inadequate knowledge of epidemiology. (See p. 22)

The majority of personnel in the environmental workforce have had no training in epidemiology. This is a serious problem resulting in misdirected effort and poorly designed programs.

— Inadequate knowledge of risk assessment. (See p. 22)

Environmental health science and protection programmatic decision making should reduce risks to public health and safety. Such decisions require agencies to determine degree of safety. Risk assessment is the application of credible science to develop estimates of the likely effects of certain activities or processes.

— Inadequate knowledge and skills regarding risk communication. (See p. 24)

Risk communication is not understood and effectively practiced by most environmental health science and protection personnel. Environmental health science and protection personnel must be skilled in identifying public concerns and public perceptions, enhancing public participation and involvement, communicating technical information consistent with public sensitivities, providing full information, understanding comparative risks, and in allaying unnecessary public concerns. Risk communication is usually considered to be an announcement, press release, or speech.

“Risk communication is not... practiced by most ... personnel....”
— Inadequate knowledge of environmental economics. (See p. 33)

It is essential that environmental health science and protection professionals have a basic understanding of the various impacts the economy has on the environment and environmental programs, and the effects of environmental programs on the economy.

— Inadequate knowledge of global environmental health science and protection issues. (see p. 13).

These include as over-population, ozone depletion, global warming, desertification, global toxification, and deforestation.

— Inadequate abilities to consider the need, net impact, and effectiveness of proposed control measures. (see p. 30, 32, 33)

Environmental health professionals must be able to scientifically prioritize programs based on good epidemiology, risk assessment, environmental economics, net impact, and program effectiveness.

— Inadequate use of the holistic public health model.

The public health model takes the community, nation, or planet as the patient and, in principle, allocates resources to maximize health and environmental quality for all. The model more commonly used is the individual physician model. In this approach, once a pathology is diagnosed, everything possible is done to cure that pathology, without regard for resources, priorities, or effects beyond the particular problem.

LEADERSHIP

Environmental health science and protection professionals directing and administering programs should objectively evaluate their roles to determine whether they are leaders or followers in scientific, managerial, policy development, and risk communication skills. Schools of public health and other graduate environmental health science and protection program faculty should also evaluate their efforts and the competencies of their graduates. The following may be useful questions for professionals, schools, programs, and accrediting bodies to consider:
— Are environmental health science and protection professionals addressing current and emerging issues, or are they comfortably continuing only those activities which are already approved?

— Are environmental health science and protection professionals leading or resisting changes in organizations, programs, and goals?

— Are environmental health science and protection professionals effectively directing public and political attention to real priorities rather than emotionally perceived priorities?

— Do environmental health science and protection professionals have the requisite knowledge and skills to assess risk, manage risk, and communicate risk?

— Do environmental health science and protection professionals understand and practice the skills and political interaction involved in the development and implementation of public policy?

— Are environmental health science and protection professionals seeking political and exempt roles at levels where policy is proposed, debated, and adopted?

— Are environmental health science and protection professionals seeking and filling policy-level environmental health science and protection positions in the full spectrum of federal, state, local and private sector environmental health science and protection organizations?

— Are schools of public health and accredited programs teaching environmental health science and protection professionals the knowledge and skills essential to leadership roles?

— Do environmental health science and protection professionals understand and practice the art of networking and constituency development?

— Do civic and political leaders recognize environmental health science and protection professionals and seek their opinions, guidance, and expertise?
— Do environmental health science and protection professionals insist that alleged problems be adequately defined and quantified prior to proposing solutions and programs?

— Do environmental health science and protection professionals understand and communicate the net environmental, health, economic, and social effects of proposed programs?

CONCLUSIONS

— Environmental health science and protection programs are components of a wide variety of public agencies and private organizations, not only organizations titled “health departments”. The field of environmental health science and protection is diverse and complex. Environmental health science and protection functions are scattered throughout a wide variety of governmental agencies. There is no central comprehensive listing of environmental health science and protection programs by state (p. 15).

— Environmental health science and protection is an integral component of the continuum of health services, and environmental health science and protection services are essential to the efficacy of the other components of disease prevention, health promotion, and health care (p. 6, 25).

— Access to health services must include access to effective environmental health science and protection services whether at home, work, play, or travelling. Such total access requires availability of environmental health science and protection professionals (p. 20, 26).

— There is a national deficit in quality and quantity of goal-oriented, interdisciplinarily educated environmental health science and protection professionals at all levels of government and industry (p. 12, 25, 26, 38, 43, 44, 45, 46).
### Healthy People Continuum

- Genetic Characteristics
- Economic Vitality
- Educational Achievement
- Quality of Life & Environment
- Health Services

### Health Services Continuum

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—Protection of the environment is a basic governmental responsibility. Most environmental health science and protection programs are based on federal mandates and needs. Therefore, solving the environmental workforce problems should be a federal government priority (p. 14).

—The quality and quantity shortage of environmental health science and protection professionals is a major obstacle to public and private efforts to prevent and solve environmental health science and protection problems (p. 12, 20, 22, 25, 26, 27, 44, 47).

—Recommendations contained in the:

• Institute of Medicine Report on the Future of Public Health
• Public Health Faculty/Agency Forum
• Seventh Report to the President and to Congress on the Status of Health Personnel in the United States
• EPA Report Reducing Risk: Setting Priorities and Strategies for Environmental Protection
• Healthy People 2000: National Health Promotion and Disease Prevention Objectives
• Stated needs of the Department of Defense and Department of Energy

cannot be fulfilled without significantly enhancing the quality and quantity of the nation’s goal-oriented, interdisciplinarily trained environmental health science and protection professionals.

—Additional effort and funding are necessary to insure a supply of properly educated baccalaureate and graduate level environmental health science and protection professionals for the field of practice as well as for research efforts (p. 12, 20, 23, 25, 26, 29, 35, 38, 44, 46).

—Environmental health science and protection training and education efforts should be directed to environmental health science and protection education objectives (p. 48) and to current and future challenges of the field of practice (p. 1).
— Academia and governmental agencies have not successfully directed efforts to primary prevention of environmental health science and protection problems. To do so, will require competencies in conducting environmental planning involving land-use, energy alternatives, product and process design, resource consumption, transportation methodologies, ecological disturbances; and involvement in economic development and public education (p. 13). This lack of emphasis on prevention exists, in part, because schools and programs have not imparted these skills to students.

— Education and training needs include properly designed, accessible short-courses and seminars to enhance the knowledge and skills of those already in the environmental health science and protection workforce (p. 34).

— Accreditation processes and criteria need considerable improvement (p. 52) and should address the needs of the field of practice.

— There is no national environmental health science and protection data collection system to determine programmatic responsibility, expenditures, and personnel needs of state and local governments (p. 21).

— Inadequate coordination exists among various federal agencies regarding education for environmental health science and protection professionals.

— Each state should have an Environmental Health Science and Protection Institute for development and dissemination of knowledge, including provision of technical assistance (p. 29).
RECOMMENDATIONS

— Enactment of and funding for a National Environmental Health Science & Protection Education and Training Act should be a top HRSA priority, and should include funding for continuing In-Service Environmental Health Science and Protection Short Courses (draft bill attached, Appendix B.). This should be accomplished by January, 1993.

— Funding priority for graduate environmental health science and protection should be given to proposals based on the proposed environmental health science and protection education objectives (p. 48) which are geared to addressing current and future environmental health science and protection challenges, (p.1).

— HRSA should develop a Cooperative Agreement with the National Environmental Health Science and Protection Accreditation Council to improve criteria and procedures and gain approval by the Office of Education and COPA by Jan. 1, 1992 (p.52).

— Obtain and tabulate information to indicate environmental health science and protection agencies responsible for the wide array of environmental health science and protection programs in each state by December 31, 1991.

— Develop a comprehensive environmental health science and protection data collection system (p.21) which will accurately indicate state and local government:
  
  - programmatic responsibility by agency
  - programmatic expenditures
  - types of personnel for each program
  - numbers and types of personnel needed.

— Provide financial incentives for developing an Environmental Health Science and Protection Institute within a university in each state in accordance with the IOM Technical recommendation (p. 29) and the recommendation of the federal Office of Management and Budget (p. 29).
— Develop an effective environmental health science and protection education and training coordinating mechanism involving Department of Health & Human Services, Environmental Protection Agency, Occupational Safety and Health Administration, Department of Defense and Department of Energy by Jan. 1, 1992.

— By year 2000, the number of properly educated environmental health science and protection professionals in the workforce should be increased from 80,000 to 180,000.

— Insure that the foregoing are promptly implemented to the end that all of the environmental health, occupational health and safety, unintentional injury, food protection, and sensitive environmental disease recommendations contained in Healthy People 2000 report may be attained.

— Recognize that the foregoing recommendations are essential to fulfilling the recommendations of:

- Healthy People 2000: National Health Promotion and Disease Prevention Objectives
- Institute of Medicine Report on The Future of Public Health
- The Public Health Faculty/Agency Forum
- The EPA Report Reducing Risk: Setting Priorities and Strategies for Environmental Protection
- Seventh Report to the President and Congress on the Status of Health Personnel in the United States
- Stated personnel needs of the Department of Defense and Department of Energy.
I. OVERVIEW OF ENVIRONMENTAL HEALTH SCIENCE AND PROTECTION

A. PROBLEM

Interest in the quality of our environment and related public health implications has never been more intense. Political leaders, whether liberal, moderate, or conservative, express the need for leadership in a wide variety of environmental health science and protection issues.

The United States is spending billions of dollars to manage and clean up our environment, but there are not nearly enough well qualified persons to implement these programs. This personnel shortage is serious. It could very well lead to a worsening of the present crisis in spite of the money being spent.

It is no longer a question of whether our environment will be managed, but rather how and by whom. "Who" is at least as important as "how" since priorities and methodologies are largely determined by the nature and quality of the environmental health science and protection workforce.

The public health community has not perceived development of the environmental health science and protection workforce as a priority for the past 20 years. This inattention has contributed to the widespread deficit of properly trained environmental health science and protection personnel. In addition, environmental activists without environmental health science and protection training are exerting a greater influence on environmental health science and protection policies and priorities than is the public health community. Individuals with little knowledge of epidemiology, biostatistics, toxicology, and risk assessment are filling key environmental agency positions where such knowledge is essential.

The Congressional Office of Technology Assessment (OTA) concluded that a shortage of experienced and technical experts may explain the current lack of quality performance and may cause a major bottleneck in an expanded
The OTA report also suggested that current educational programs may not be able to prepare sufficient numbers of some professionals.

A recent report by the Department of Health and Human Services, Bureau of Health Professions concluded that there are shortages of environmental health science and protection personnel in nearly every category, and that only eleven percent have formal education in public health. It estimated a need for 120,000 more professionals in order to effectively address the various environmental health science and protection problems identified to date.

To a significant degree, schools of public health have fallen short of the need to educate environmental health science and protection practitioners. Most of today's environmental health science and protection professionals are being trained in accredited environmental health science and protection programs outside schools of public health.

The recent Institute of Medicine Report on The Future of Public Health states, "many observers feel that some schools have become somewhat isolated from public health practice and therefore no longer place a sufficiently high value on the training of professionals to work in health agencies." The report recommends that "schools of public health should establish firm practice links with state and/or local public health agencies."

Environmental health science and protection programs, in whatever agency they are institutionalized, share public health goals. The programs and administering agencies would not exist except for the public health rationale. An environmental protection agency or an occupational health and safety
"An environmental protection agency or an occupational health and safety agency is a health agency...."

Administration is a health agency as much as is a state health department. We should make every effort to ensure that these primary environmental and occupational health agencies are comprehensive in programmatic coverage, staffed by appropriate professionals, and programmed on the basis of sound epidemiology, toxicology, and risk assessment information.

The public health paradigm demands that education for environmental health science and protection and the design of agency programs be geared to primary prevention rather than the current and common practice of secondary prevention. Most environmental health science and protection programs are curative in nature, reacting to problems created by decisions made earlier by other governmental and private sector interests. Appropriately trained environmental health science and protection professionals need to become involved in a preventive mode at the time initial decisions are being made regarding:

- land use
- resource utilization
- energy alternatives
- transportation systems
- product and process design
- population policies
- economic development
- and public education.

Thus environmental health science and protection educated personnel should seek leadership roles in a wide variety of settings, rather than only in traditional health departments.

Except for a few individuals, environmental health science and protection leadership is noticeably absent in the current debates over such global issues.
"...environmental health science and protection leadership is noticeably absent...over such global issues...."

World ecology. Environmental health science and protection leaders need to be prepared to be constructively involved and effective in planning to counter such global threats to our delicate ecological system.

Many of our nation's environmental health science and protection ills can be traced to a shortage of goal-oriented, interdisciplinarily trained environmental health science and protection practitioners. Other professionals in environmental health science and protection—such as geologists, chemists, physicians, attorneys, engineers, physicists, and biologists—are essential, but are not usually trained in the basic public health sciences which have a health goal and orientation.

While the private sector plays an important role, protection of the environment is primarily the responsibility of various levels of government. Most environmental health science and protection activities at the state and local level are matters of national policy, mandated by federal requirements. Therefore, not only should the government be funding environmental health science and protection programs, but should have a priority of solving environmental health science and protection workforce problems. Experts at a recent Public Health Service Bureau of Health Professions workshop stated that "the government has failed to provide the leadership...for developing the supply of properly trained personnel that is essential for effective and comprehensive program management."

 Appropriately trained environmental health science and protection personnel will not guarantee resolution of all our environmental health science and protection problems, but, without them, the task is impossible.

"...without them, the task is impossible."
B. TERMINOLOGY

1. Environmental health science and protection refers to protection against those environmental factors such as air, food, water, radiation, toxic chemicals, and wastes which adversely impact on human health or ecological balances—whether in industries, businesses, institutions, homes, recreational areas, vehicles, urban or rural areas, or outer-space. (See graphic titled Environmental Health Science and Protection Relationships, on the following page, p. 16).

2. Environmental health science and protection programs are groupings of appropriate activities designed to enhance and protect human health and prevent ecological damage by managing environmental factors.

3. Environmental health science and protection agencies. Environmental health science and protection programs are organized and administered within a wide variety of federal, state, and local agencies as well as by industry, voluntary, and citizen groups. Major federal agencies include the U.S. Environmental Protection Agency; the Occupational Safety and Health Administration; the U.S. Public Health Service National Institute of Environmental Health Sciences, National Institute for Occupational Safety and Health, the Centers for Disease Control, Indian Health Service, Food & Drug Administration, Agency for Toxic Substances and Disease Registry, and the National Institutes of Health; certain activities of the Department of Housing and Urban Development; the Department of Defense; the Department of Agriculture; the Interior Department; the Coast Guard; and the National Aeronautics and Space Administration.

State level environmental health science and protection agencies and programs are organizationally located in a wide variety of state agencies such as health departments, environmental protection agencies, ecology, conservation, natural resources, pollution control, agriculture, atomic energy, occupational health and safety, environmental management, and many others.
ENVIRONMENTAL HEALTH SCIENCE
AND PROTECTION RELATIONSHIPS

Larry J. Gordon
Local environmental health science and protection programs are typically components of local health departments. However, a number of jurisdictions in the western United States have established local environmental health science and protection departments. Environmental health science and protection activities are also found within such local agencies as public works, housing, planning, solid waste management, and special-purpose districts.

Many universities have established their own organizations designed to administer university-wide environmental health science and protection programs.

There has been an increasing trend for major industries and businesses to employ their own environmental health science and protection professionals to address their internal environmental health science and protection problems.

A few of the larger citizen environmental activists groups also have environmental health science and protection activities.

4. Environmental health science and protection activities or program methods include planning, sampling, surveillance, data collection and interpretation, research, regulation, education, design, risk assessment, risk communication, demonstration, epidemiology, policy development and implementation, constituency building, citizen participation, management and prioritization.

5. Environmental health science and protection professionals are those who have been adequately educated in the various environmental health science and protection technical components and in the basic public health sciences of epidemiology, biostatistics, toxicology, and risk assessment.

6. Professionals in environmental health science and protection include, but are not limited to such essential personnel as chemists, geologists, biologists, meteorologists, physicists, engineers, physicians, attorneys, planners, epidemiologists, social marketing professionals, biostatisticians, public administrators, toxicologists, and planners.
7. **Environmental health science and protection personnel titles.** There is no semblance of standardization of titles, thereby resulting in hundreds of titles being utilized by the various environmental health science and protection agencies. A few of the more common titles include environmental health scientist, environmental health specialist, environmental health planner, environmental epidemiologist, environmental program manager, sanitarian, environmental health engineer, and environmentalist.

8. **Environmental health science and protection agency mission:** the provision of adequate effective services to assure environmental conditions in which this and future generations of people can be healthy and the environment protected.

9. **Health services** refer to the continuum of environmental health science and protection, disease prevention, health promotion, and health care services all of which are designed to insure a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity. To be effective, however, these services should be part of a larger continuum of factors including genetic characteristics, economic well-being, educational achievement and an acceptable quality of life and environment. (See graphic containing *Health Services Continuum*, p. 6.)

   a. **Public Health** is comprised of environmental health science and protection, disease prevention, and health promotion and is the art and science of preventing disease and injury, prolonging life, promoting health and efficiency, and insuring a healthful environment through organized community effort.

   b. **Environmental Health Science and Protection** (previously defined, p. 15).

   c. **Disease Prevention** includes those activities such as counseling, screening, immunization, or chemoprophylactic interventions for individuals in clinical settings. These activities are designed to prevent disease and disability. Priority strategies are aimed at

   — 18 —
maternal and infant health; heart disease and stroke; cancer; diabetes; and chronic, disabling conditions.

d. **Health Promotion** includes those strategies relating to individual life-style that can have a positive influence on quality of life, morbidity, and mortality. Priority areas include physical activity and fitness, nutrition, tobacco, alcohol and other drugs, family planning, mental health, and violent and abusive behavior. Strategies for health promotion include educational and community based programs.

e. **Health Care** refers to those diagnostic and treatment services designed to treat or rehabilitate a patient under care. These services include diagnosis, treatment, case management, outpatient services, clinics, surgery, rehabilitation, long-term care and treatment services for mental health and developmental disabilities.

C. **ROLES OF ENVIRONMENTAL HEALTH SCIENCE AND PROTECTION PROFESSIONALS**

Environmental health science and protection professionals have held positions in official agencies in roles varying from entry level to cabinet secretaries and other policy and managerial levels. They have also shown leadership as directors of environmental protection agencies, laboratories, and health departments; as deans of schools of public health, program directors of academic environmental health science and protection programs, research scientists, as well as performing capably in such environmental health science and protection programs as air, water pollution, water supply, disease vector control, occupational health and safety, radiation protection, environmental health science and protection planning, hazardous wastes, food protection, noise pollution control and solid waste management at all levels of the public and private sector in a wide variety of agencies requiring environmental health science and protection skills. Their interdisciplinary training makes them particularly valuable in effectively addressing complex, multi-faceted environmental health science and protection problems.
D. ACCESS TO ENVIRONMENTAL HEALTH SCIENCE AND PROTECTION SERVICES

Every citizen of our nation deserves the benefits of effective environmental health science and protection services whether at home, work, play, or travelling. This means the assurance of freedom from environmental factors which are known to adversely affect human health, safety, comfort, and well-being.

There is no standard organizational model for the delivery of these essential environmental health science and protection services. Even in areas having the benefits of a reasonably comprehensive environmental health science and protection agency, there are numerous agencies in addition to a lead agency. Additionally, services are delivered in an inconsistent patch-work pattern by federal, state, and local agencies. However, regardless of the organizational pattern for service delivery, every individual should have protection from unsafe environmental factors such as toxic chemicals, polluted air or water, unsafe drinking water, unintentional injuries, unsafe food, dangerous radiation levels, solid waste, hazardous waste, vector-borne disease, global environmental health problems, and unsafe conditions. Access to these services is essential in order to ensure an acceptable quality of life for the entire populace.

Such access, however, will not be fully effective without the full involvement of environmental health science and protection professionals having a working knowledge of environmental health science and protection technical areas as well as risk assessment, problem prioritization, epidemiology, toxicology, biostatistics, environmental economics, cost-benefit of programs, risk communication, and public policy development and implementation.

Access will require that measures be taken to insure the availability of environmental health science and protection professionals in a quantity and of a quality high enough to protect this and future generations from health hazards of a complex, technological environment.
II. RELEVANT NATIONAL ENVIRONMENTAL HEALTH REPORTS

A. PUBLIC HEALTH FOUNDATION

The data collected and published by the Public Health Foundation are incomplete for environmental health science and protection throughout the nation. The annual questionnaire is sent to the "state health official" in each state, while not addressing the need for data from other public health, mental health, or environmental health science and protection agencies. The PHF data include only those environmental health science and protection activities under the purview of the "state health official". Inasmuch as there are probably more environmental health science and protection activities outside than within the scope of the "state health official," we have no useful national data collection effort relating to environmental health science and protection. With comprehensive reporting, a many-fold increase in environmental health science and protection activities would be portrayed beyond that reported by the PHF, thereby indicating a radically higher percentage of effort and emphasis on environmental health science and protection as compared with other public health functions.

B. INSTITUTE OF MEDICINE (IOM) REPORT — THE FUTURE OF PUBLIC HEALTH

The IOM Report on the Future of Public Health provides thoughtful discussions which should be mandatory reading by every public health professional. The emphasis of the report is on personal health, health care, and relationships to the medical community with occasional, though significant, reference to the importance of environmental health science and protection. Environmental health science and protection agencies outside health departments were not visited or included in the study. By relying on the Public Health Foundation Data, this study may contribute to misunderstanding of, and inadequate emphasis on, environmental health science and protection by the public health community and others.
The report provides many observations and recommendations which may be useful to environmental health science and protection. Salient points from the IOM study have been included among issues discussed in this document. None of the IOM recommendations that may be relevant to environmental health science and protection can be accomplished without the involvement of properly educated environmental health science and protection professionals for many appropriate roles at all levels of environmental health science and protection agencies.

Key points from the IOM report are included below:

1. "The Governmental Role in Public Health"

   The IOM report finds that the core functions of public health agencies at all levels of government are assessment, policy development, and assurance.

   a. Assessment

   "The committee recommends that every public health agency regularly and systematically collect, assemble, analyze, and make available information on the health of the community, including statistics on health status, community health needs, and epidemiologic and other studies of health problems."

   Discussion

   This IOM recommendation will be impossible to achieve in the absence of an adequate environmental health science and protection workforce. Currently, major environmental health science and protection decisions are frequently being made, public and private sector policy developed, and actions taken on the basis of emotionalism and environmental extremism at the insistence of effective, vocal activist groups, rather than on the basis of sound epidemiology, risk assessment, and cost-benefit studies.
The nation is spending billions of dollars on minor or non-existent environmental health science and protection problems, thereby adversely impacting the economy as well as making it much more difficult to fund serious, high priority issues. Recent issues of questionable scientific importance include radon, alar, asbestos, and radioactive waste management. Basing public health priorities on sound epidemiology and risk assessment would dictate a very different utilization of scarce funds. Such program prioritization will be impossible in the absence of an adequate environmental health science and protection workforce trained in risk assessment and risk communication.

b. Policy Development

The IOM “committee recommends that every public health agency exercise its responsibility to serve the public interest in the development of comprehensive public health policies by promoting use of the scientific knowledge base in decision-making about public health and by leading in developing public health policy. Agencies must take a strategic approach, developed on the basis of a positive appreciation for the democratic political process.”

Discussion

As a profession, environmental health science and protection professionals have been significantly lacking in knowledge, skills, and effectiveness when it comes to positively affecting public policy development and implementation. For the most part, graduates of schools of public health and other accredited environmental health science and protection programs, are not adequately skilled, knowledgeable,
or effective in the political process. Criteria of the Council on Education for Public Health and the National Council for Environmental Health Science and Protection Accreditation should include public policy and risk communication competency requirements.

Such competencies would include:

- a thorough understanding of the public policy process; how concepts are developed into bills, ordinances, regulations, or standards; how to coordinate with public interest groups in order to effectively impact the legislative process; and implementing the requirements of legislation and executive orders.

- an understanding of the major public and private agencies and groups involved in environmental health science and protection, including their missions, methods, and areas of interest.

- knowledge of constitutional and statutory authorities at the federal, state, and local levels which provide the framework, authorizations, and requirements for a comprehensive spectrum of environmental health science and protection programs.

- skills essential to effectively and accurately communicating environmental health science and protection risks including: utilizing the scientific method, building political support, providing full information and disclosure, allaying concerns, using appropriate language, involving the public at early stages, understanding public perceptions, and understanding comparative risk analysis.

c. Assurance

The IOM Report further states “the committee recommends that services necessary to achieve agreed upon goals are provided either by encouraging actions by other entities (private or public sector), by requiring such action through regulation, or by providing services directly.”
Discussion

Certain national environmental health science and protection goals are contained in *Healthy People 2000*. (These are amplified in section II . F. of this document, p. 45.) Other environmental health science and protection goals have been established by a plethora of official and citizen advisory groups at the state and local levels throughout the nation. Effective service delivery to attain these various goals can most effectively be assured by a knowledgeable, qualified environmental health science and protection workforce. The 1988 Bureau of Health Professions report, *Evaluating the Environmental Health Workforce*, addresses the workforce issue and concludes that there are shortages of environmental health personnel in nearly every program category, and that only eleven percent have formal education in public health. The report estimated a need for 120,000 more professionals in order to effectively address the various environmental health problems identified to date. The necessary cadre of environmental health science and protection professionals is essential to “encouraging actions by other entities (private or public sector), by requiring such actions through regulation, or providing services directly.” Environmental health science and protection agencies (see terminology) are key players in all the previously stated assurance actions.

The IOM Report further “recommends that each public health agency involve key policy makers and the general public in determining a set of high-priority personal and community-wide health services that governments will guarantee to every member of the community.”

Environmental health science and protection is an integral and essential component of the continuum of community health services consisting of environmental health science and protection, disease prevention, health promotion, and health care. (See graphics with *Health Services Continuum*, p. 6). Without having safe food, clean air and
and healthy workplaces and communities, and proper waste management, other components of the health services continuum will be ineffective. Properly educated environmental health science and protection professionals are essential to this IOM assurance recommendation.


The Institute of Medicine Report on The Future of Public Health recommends “provision of funds for states to strengthen state capacity for services, especially to achieve an adequate minimum capacity, and to achieve national objectives”.

Discussion

Minimum capacity for access to basic environmental health science and protection services will not be achieved without qualified personnel available at all levels of the various types of environmental health agencies. Currently, most positions are filled by individuals who do not have the requisite training to effectively prevent and solve environmental health science and protection problems through well-designed environmental health science and protection activities. Developing personnel with the necessary knowledge, skills, and abilities will require the concentrated and targeted efforts of accredited schools of public health and other accredited environmental health science and protection programs.
3. **Federal Responsibility for Assurance of Action and Services in the Public Interest of the Entire Nation**

The IOM Report recommends “assurance of action and services that are in the public interest of the entire nation such as — interstate environmental actions, and food and drug inspection.”

**Discussion**

Interstate environmental actions include such environmental health science and protection programs as air pollution control, water pollution control, hazardous waste management, solid waste management, and food protection. Each of these programs requires the skills of environmental health science and protection professionals. Such interstate environmental health science and protection problems are addressed by a variety of environmental health science and protection agencies in the public and private sectors. Federal agencies include the Public Health Service, EPA, Department of Transportation, Coast Guard, Energy Department, and Defense Department. Assurance of appropriate interstate environmental action including food protection will not be fully effective without the involvement and leadership of environmental health science and protection professionals educated in the appropriate environmental health science and protection technical areas and in the basic environmental health sciences including epidemiology, toxicology, biostatistics, and risk assessment.

4. **Special Linkages**

**Environmental Health**

The IOM “Committee recommends that state and local health agencies strengthen their capacities for identification, understanding, and control of environmental problems as health hazards. The agencies cannot simply be advocates for the health aspects of environmental issues, but must have direct operational involvement.”
Discussion

For the past twenty years, health departments at the federal, state, and local levels have continued to lose responsibility for environmental health science and protection programs, particularly the better funded ones relating to air, water, and wastes. These program transfers have been due to apathy; lack of public health leadership; overt actions by public health officials; and environmental activists demanding more visibility, greater responsiveness, and enhanced effectiveness for environmental health science and protection programs. During the same time, health departments have increasingly moved away from public health and toward greater involvement in health care. Schools of public health have placed increased emphasis on health care and research as a matter of economic survival, and no longer emphasize preparing practitioners and relating to the field of practice as they once did.

It is probable that the trend toward separate environmental health science and protection agencies will continue, particularly at the state level. If health departments are to "strengthen their capacities for identification, understanding, and control of environmental problems as health hazards," strong leadership derived from the skills and knowledge of environmental health science and protection professionals will be essential. It will not be accomplished by edicts, wishes, or pontification on the part of public health officials who desire to re-enact the traditional health departments of past decades. With the increasing drift of health departments into health care, it becomes increasingly impossible to convince legislators of any tenuous connection between treatment of the human machine and prevention of damage to the environment including the human machine.

Public health officials must recognize that there are many "health agencies" in every state, and that separate environmental health science and protection
...there are many ‘health agencies’ in every state...."

agencies number among them. These environmental health science and protection agencies have health goals and are charged with protecting the public health just as certainly as are “personal health departments.” Additionally, the public and environment will be best served if these environmental health science and protection agencies are led and staffed by environmental health science and protection professionals in appropriate positions. Inasmuch as most environmental health science and protection programs exist by federal mandate, it is appropriate for the federal government to insure development of an adequate supply of environmental health science and protection professionals.

5. Strategies For Capacity Building

a. Technical

— The IOM Committee recommends “there should be an institutional home in each state and at the federal level for development and dissemination of knowledge, including research and the provision of technical assistance to lower levels of government and to academic institutions and voluntary organizations.

— Research should be conducted at the federal, state, and local levels into population-based health problems, including biological, environmental, and behavioral issues. In addition to conducting research directly, the federal government should support research by states, localities, universities, and the private sector.”

Discussion

The federal Office of Management and Budget, in an April 1, 1990-March 31, 1991 report entitled Regulatory Program of the United States Government, states that “The need to keep risk assessment and risk management separate has long been the objective of responsible public officials.”
These IOM and OMB recommendations could best be accomplished by providing start-up financial incentives for each state to organize and staff an Environmental Health Science and Protection Research and Service Institute within a university. By insuring good environmental epidemiology and risk assessment studies specific to each state, environmental health science and protection issues would be better defined and prioritized. In such a system, program funding could address science-based recommendations rather than public hysteria. By basing such institutes in academic settings and separating them from operating agencies, emotionalism would be alleviated.

Environmental health science and protection professionals having interdisciplinary training and a public health philosophy would be essential to the success and effectiveness of such institutions.

b. Political

— “Public health agency leaders should develop relationships with and educate legislators and other public officials on community health needs, on public health issues, and on the rationale for strategies advocated and pursued by the health department. These relationships should be cultivated on an ongoing basis rather than being neglected until a crisis develops.

— “Agencies should strengthen the competence of agency personnel in community relations and citizen participation techniques and develop procedures to build citizen participation into program implementation.

— “Agencies should develop and cultivate relationships with physicians and other private sector representatives. Physicians and other health professionals are important instruments of public health by virtue of such activities as counseling patients on health promotion and providing immunizations. They are important determinants of
public attitudes and of the image of public health. Public health leaders should take the initiative to seek working relationships and support among local, state, and national medical and other professional societies and academic medical centers.

— "Agencies should seek stronger relationships and common cause with other professional and citizen groups pursuing interests with health implications, including voluntary health organizations, groups concerned with improving social services or the environment, and groups concerned with economic development.

— "Agencies should undertake education of the public on community health needs and public health policy issues.

— "Agencies should review the quality of "street-level" contacts between department employees and clients, and, where necessary, conduct in-service training to ensure that members of the public are treated with cordiality and respect."

Discussion

Environmental health science and protection personnel have been significantly ineffective in constructively impacting the political process, community networking, and developing knowledgeable supportive constituencies. Environmental health science and protection personnel must capably interrelate with economic development groups, educators, planners, scientific bodies, political leaders, and industry and trade groups.
6. Roles of Schools of Public Health and Other Accredited Programs

a. Education for Public Health

The IOM Committee recommends “schools of public health should provide students an opportunity to learn the entire scope of public health practice, including environmental, educational, and personal health approaches to the solution of public health problems; the basic epidemiological and biostatistical techniques for analysis of these problems; and the political and management skills needed for leadership in public health.”

Discussion

This recommendation should also include and apply to accredited environmental health science and protection programs outside schools of public health. Due to the accreditation requirements of the Council on Education for Public Health and the National Environmental Health Science and Protection Accreditation Council, this recommendation is generally met except for the latter portion pertaining to “the political and management skills needed for leadership in public health.” This weakness varies by school and program, but it is commonplace for graduates to have inadequate knowledge in these areas. A specific strengthening of accreditation requirements to address this deficit would be a useful contribution to environmental health science and protection education and practice. Special purpose project grants to strengthen these competencies in schools and programs would be a positive step.

Graduates should have:

— Knowledge of the laws by which environmental health science and protection problems are prevented and managed.
— Knowledge of risk communication, and cost-benefit analysis
with special attention to public participation and an ability to communicate technical information consistent with public sensitivities.

- Knowledge of local, state, federal, and voluntary environmental health science and protection agencies and their responsibilities.

- Skills in collection, analysis, and interpretation of scientific data, and use of computers with modern data systems.

- Knowledge of the planning, development, and implementation of public policy.

- Skills to effectively and equitably negotiate and resolve controversial environmental health science and protection problems.

Some specific course descriptions to address some of these competencies include:

- Environmental Economics — Study of the various impacts which the economy has on the environment and environmental health science and protection programs, and the impact of environmental health programs on the economy. Understanding economic cost/benefit analysis of environmental health science and protection policy and regulatory decisions, economic forecasting of issues and conditions likely to affect environmental health, and evaluating the economic costs of pollution and environmental health science and protection measures.

- Risk Communication — Developing the skills to effectively and accurately communicate environmental health science and protection risks based on being scientific and credible, developing political support and constituents, providing full information, allaying concerns, using appropriate language, involving the public at early stages, understanding public perceptions and understanding comparative risks.

- Policy Development and Implementation — Providing a thorough understanding of the legislative process for city, county, state, and federal governments; how ideas are developed into bills,
ordinances, regulations, or standards; how to effectively impact the legislative process; and implementing the requirements of such legislation or executive orders.

— Local, State, Federal, Citizen, and Private Sector Organizations — An understanding of the major public and private agencies and groups involved in environmental health science and protection, their missions, methods, and areas of interest.

— Environmental Health Science and Protection Law — A study of the constitutional and statutory authorities at the federal, state, and local levels which provide the framework, authorizations, and requirements for a comprehensive spectrum of environmental health science and protection programs.

— Program Evaluation — Public policy and program evaluation techniques including PERT, quasi-experimental design, impact analysis, and program monitoring techniques.

b. Short-Courses and Continuing Education

The IOM Committee recommends: “In view of the large numbers of personnel now engaged in public health without adequate preparation for their positions, the schools of public health should undertake an expanded program of short courses to help upgrade the competence of these personnel. In addition, short course offerings should provide opportunities for previously trained public health professionals, especially health officers, to keep up with advances in knowledge and practice.”

Discussion

Environmental health science and protection problems associated with the modern rapidly changing technological environment are significantly different than they were only a few years ago. Environmental health science and protection professionals and professionals in environmental health science and protection who do
"...professionals...are soon ineffective and out-of-date."

not take affirmative steps to keep current are soon ineffective and out-of-date. Short courses should be regularly offered to the environmental health science and protection workforce in each state or, in some areas, regionally. Schools and environmental health science and protection programs are in unique positions to fill this gap. Most environmental health science and protection personnel are in dire need of "retreading" to effectively prevent environmental health science and protection problems and ameliorate those in existence. Accreditation criteria for schools of public health and environmental health science and protection programs should require short courses and continuing education targeted for prioritized field-of-practice environmental health science and protection issues.

c. Relation of Curricula to Practice

The IOM Report notes that: "Many observers feel that some schools have become somewhat isolated from public health practice and therefore no longer place a sufficiently high value on the training of professionals to work in health agencies. The dearth of professional agency leadership noted by the committee during the study may lend support to this view. The observed variations in agency practice, inadequate salaries, and frequently negative image of public health practices may partly account for any less than desirable responses by the educational institutions to the needs of practice."

Discussion

This observation articulates a widespread, longstanding concern expressed by practitioners for many years. The IOM comments have, thankfully, sparked positive interest and discussions regarding specific steps to address this problem. The recommendations of the Public Health Faculty/Agency Forum convened by the Johns Hopkins School of Hygiene and Public Health deal with the IOM comments in the most constructive and comprehensive manner. The Public Health Faculty/Agency Forum Report is discussed below in this document.
C. PUBLIC HEALTH FACULTY/AGENCY FORUM

One of the conclusions of the Institute of Medicine Report on the Future of Public Health is that the provision of public health is uneven and needs strengthening across the nation, partly due to the lack of well qualified professionals. The IOM report notes "that some schools have become somewhat isolated from public health practice" and recommended that "schools of public health establish firm practice links with State and/or local public health agencies." As a follow-up on these IOM conclusions and recommendations, a number of national organizations engaged in a collaborative effort to develop recommendations to make education in the schools of public health more relevant to practice.

The agencies engaged in this effort included:

- American Public Health Association
- Association of Schools of Public Health
- Association of State and Territorial Local Health Liaison Officials
- Centers for Disease Control, Public Health Practice Program Office
- Health Resources and Services Administration, Bureau of Health Professions
- U.S. Conference of Local Health Officers
- National Association of County Health Officials
- Association of State and Territorial Health Officials

The Public Health Faculty/Agency Forum developed universal competencies appropriate to all public health students, faculty and professionals. The report also notes that the competencies and recommendations should apply not only to schools of public health, but also to other public health academic programs (such as graduate environmental health science and protection programs).
Universal competencies include:
  — analytical skills,
  — communication skills,
  — policy development/program planning skills,
  — cultural skills,
  — basic public health sciences skills,
  — and financial planning and management skills.

Universal recommendations include:
  — practicum experiences,
  — collaboration and communication among agencies and schools,
  — professional and student education and teaching methods,
  — and human and fiscal resources necessary for implementing the other recommendations.

The environmental health competencies include:
  — Risk Assessment Skills
  — Risk Management Skills
  — Risk Communication Skills
  — Environmental Epidemiology
  — Biostatistics
  — Basic sciences, to understand principles of toxicology, chemistry, physics, physiology and microbiology
  — Communicable disease/chronic disease
  — Economic considerations in environmental health
  — Environmental Law

D. SEVENTH REPORT TO THE PRESIDENT AND CONGRESS ON THE STATUS OF PUBLIC HEALTH PERSONNEL IN THE UNITED STATES

The Seventh Report is a continuation of a series of reports on health personnel assembled by the Secretary of Health and Human Services and submitted to the President and Congress in response to the directive of several different sections of the Public Health Service Act.
The following quotes are from the Seventh Report:

"According to a recent workshop on environmental health training, the system for educating environmental health professionals is experiencing many difficulties (DHHS, 1989a). The U.S. Public Health Service (PHS) was urged to take the lead in developing a national plan for education of a new cadre of environmental public health specialists and to convene a coordinating group on a regular basis to consider improvements in undergraduate, graduate, and continuing education. It was recommended that a portion of all funds appropriated for environmental activities be set aside for the education and training of personnel to implement these programs.

"Environmental Health

"The Sixth Report to the President and Congress on the Status of Health Personnel in the United States discussed in detail available information on the education and utilization of environmental and occupational health personnel. Reports and studies were presented by the Environmental Protection Agency, National Academy of Sciences, National Environmental Health Association, American Industrial Hygiene Association, National Institute of Environmental Health Sciences, and others. To help close the information gap, the Bureau of Health Professions funded a study and workshop to evaluate supply and demand and need for environmental health personnel (DHHS, 1988b). Workshop participants represented a broad spectrum of environmental health areas and all levels of government, private industry, academia, and professional associations. According to available data and estimates made by workshop participants, there were approximately 235,000 professionals providing environmental health services in 1987."
Environmental Health Professionals, 1987

<table>
<thead>
<tr>
<th>Specialty</th>
<th>Professionals</th>
<th>Other</th>
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<tr>
<td></td>
<td>Environmental Public Health</td>
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<tr>
<td>Air Quality Workers</td>
<td>4,000</td>
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<td>Water Quality Personnel</td>
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<tr>
<td>Injury Control Workers</td>
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<td>300</td>
</tr>
<tr>
<td>Academicians</td>
<td>2,100</td>
<td>0</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
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<td><strong>155,000</strong></td>
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"Only about 80,000 have formal education in environmental health sciences and can be called environmental health professionals. Another 155,000 were professionals with relevant skills, such as engineers and chemists, who were engaged in environmental health activities, but who have no training in environmental public health. There were also about 480,000 technicians and operators for a total work force of 715,000.

"There are large shortages of environmental and occupational health personnel. Of the 235,000 professionals in the 1987 work force about 40,000 needed additional training and 120,000 additional individuals are needed in the work force."
“Most environmental programs involve administration of environmental laws. Thus, a large portion of the personnel are employed in government agencies. Practitioners are also employed by industry, educational institutions, consulting firms, and other parts of the private sector. Even though all sectors of society should be concerned about environmental work problems, workshop participants concluded that protection of the environment is primarily the responsibility of all levels of government. They recommended that the U.S. Public Health Service take the lead in developing a plan “to delineate the necessary training and education of the workforce...” In response to this recommendation the Bureau of Health Professions sponsored an “Environmental Health Faculty/Employer Forum” and an analysis of a survey of environmental health staff in State and local health departments.

“The “Environmental Health Faculty/Employer Forum” was convened in Ann Arbor, Michigan on May 1-4, 1988 (DHHS, 1989a). Workshop participants included academicians, representatives from all levels of government, industry and other private sector employers. Experts at the Forum concluded that academic institutions educating environmental health professionals face a crisis in student recruitment, curricula, and relevance of their programs to community needs. Among difficulties identified were:

— Shortcomings in communications, decision making, leadership, and management;

— Students who are not learning to think creatively and solve problems;

— Lack of resources for training and technology transfer;

— Faculty having difficulty in keeping up with the state of the art of the profession; and

— Continuing education activities that have not developed a public health perspective, especially in dealing with multiple systems and health effects.

“Many of the problems are related to defining the scope of the profession including essential competencies and quality measures. Workshop participants urged academic, professional, and employer groups to convene an ongoing coordinating group to consider improvements in undergraduate, graduate, and continuing education in the hope that such a council would facilitate agreement on roles, responsibilities, and education for environmental health personnel.”

— 40 —
"Conclusions and Recommendations

Although adequate information on the public health work force does not exist, information obtained from experts attending workshops and the limited data that are available suggests there is a shortage of public health professionals and a growing crisis in public health education. The following recommendations are made to solve these problems:

1. Obtain better data on public health personnel through joint Federal/State and local government efforts, including professional associations that represent the agencies.

2. Conduct studies to develop methods for making education of public health professionals more relevant to practice in public agencies.

3. Enrollment in schools of public health and other graduate programs in public health should be increased to alleviate shortages in certain specialties.

4. Schools of public health, departments of preventive medicine, and other educational programs should intensify recruitment efforts to attract physicians, scientists, engineers, and minorities to careers in public health.

5. More health professionals need skills in health promotion and disease prevention. In order to increase the numbers with these skills, health professions faculty, curriculum, student selection, accreditation, and certification standards must all be modified.

6. Education for public health professionals must include more emphasis on HIV/AIDS, substance abuse, and geriatrics.

7. Since there are large shortages of certain environmental health personnel as well as an educational system that needs improving, a national plan for the education of a new cadre of environmental public health specialists is needed.

8. Continuing education activities and support for current public health professionals to obtain additional education should be provided.
E. REDUCING RISK: SETTING PRIORITIES AND STRATEGIES FOR ENVIRONMENTAL PROTECTION

The September 1990 Report of the EPA Science Advisory Board: Relative Risk Reduction Strategies Committee titled *Reducing Risk: Setting Priorities and Strategies for Environmental Protection* suggests steps that EPA should take to improve its own efforts and to involve Congress and the rest of the country in a collective effort to reduce environmental risks. Prepared by a special Relative Risk Reduction Strategies Committee comprised of 39 distinguished scientists and other experts from academia, state government, industry, and public interest groups, the Report provides a thoughtful relative listing of various environmental problems. Problems are organized into two areas: "Risks To The Natural Ecology and Human Welfare" and "Risks to Human Health". The Report contains ten major recommendations as follows:

1. EPA should target its environmental protection efforts on the basis of opportunities for the greatest risk reduction.

2. EPA should attach as much importance to reducing ecological risk as it does to reducing human health risk.

3. EPA should improve the data and analytical methodologies that support the assessment, comparison, and reduction of different environmental risks.

4. EPA should reflect risk-based priorities in its strategic planning processes.

5. EPA should reflect risk-based priorities in its budget process.

6. EPA—and the Nation as a whole—should make greater use of all the tools available to reduce risk.

7. EPA should emphasize pollution prevention as the preferred option for reducing risk.

8. EPA should increase its efforts to integrate environmental considerations into broader aspects of public policy in as fundamental a manner as are economic concerns.
9. EPA should work to improve public understanding of environmental risks and train a professional workforce to help reduce them.

10. EPA should develop improved methods to value natural resources and to account for long-term environmental effects in its economic analyses.

Recommendation #9 is particularly germane to the issue of an adequate supply of properly educated environmental health personnel. Recommendation #9 further states that:

"EPA also should take several specific steps to develop and sustain the nation's scientific capability and workforce. For example, the Agency should provide technical and financial assistance to universities to help them incorporate environmental subject matter into their curricula and to train the next generation of environmental scientists and engineers.

"In this regard, EPA should support graduate and post-graduate training programs in the relevant scientific disciplines, and nurture the participation of the scientific community in interdisciplinary research. The nation is facing a shortage of environmental scientists and engineers needed to cope with environmental problems today and in the future. Moreover, professionals today need continuing education and training to help them understand the complex control technologies and pollution prevention strategies needed to reduce environmental risks more effectively.

"EPA also should expand its support for environmental training programs targeted at Federal, State, and local officials. Most environmental officials have been trained in a subset of environmental problems, such as air pollution, water pollution, or waste disposal. But they have not been trained to assess and respond to environmental problems in an integrated and comprehensive way. Moreover, few have been taught to anticipate and prevent pollution from occurring or to utilize risk reduction tools beyond command-and-control regulations. This narrow focus is not very effective in the face of the intermediate environmental problems that have emerged over the past two decades and that are projected for the future."
Discussion

This EPA Report will undoubtedly influence environmental policy at all levels of government and industry throughout the country, and should be required reading for all policy and management level environmental health personnel as well as environmental health science and protection academicians and students. EPA policies have a significant impact on the quality and quantity of environmental health science and protection personnel supply and demand. Therefore, the policies and efforts of EPA and the U.S. Public Health Service to “train a professional workforce” should be jointly planned and coordinated. Hopefully, EPA will agree that the professional workforce must be well-grounded in the basic environmental health sciences, and the Public Health Service should recognize the need for environmental health science and protection professionals to understand the delicate ecological balance of our planet and its essential relationship to the health of the public.

It is heartening to note this recommendation and its content relating to the interdisciplinary approach, continuing education, and the need to emphasize prevention rather than after-the-fact treatment.

F. HEALTHY PEOPLE 2000: NATIONAL HEALTH PROMOTION AND DISEASE PREVENTION OBJECTIVES

This document contains a national strategy for significantly improving the health of the Nation over the coming decade. Environmental health science and protection objectives are listed pertaining to unintentional injuries, occupational safety and health, air pollution, radon, toxic chemicals, solid wastes, drinking water, surface water, lead-based paint, hazardous waste sites, recycling, household hazardous wastes, smoking in the workplace, food-borne illness, and sentinel environmental diseases. The document includes the following statements regarding environmental health science and protection personnel needs:
"Personnel Needs:

"Priorities for ensuring trained personnel to achieve the environmental health objectives include the following:

— Expand the number of health professionals to address the practice, educational, and research aspects of the objectives.

"A recent study by the Bureau of Health Professionals, Health Resources and Services Administration (HRSA), determined that in 1987, 121,000 additional environmental health specialists were needed (environmental scientists, geologists, chemists, biologists, toxicologists, hydrogeologists, and engineers). In addition to the need for environmental health specialists, HRSA documented that 40,000, or 17 percent of the current work force of 250,000, is inadequately trained.

"Currently, there are only 1,500 environmental health graduates nationwide each year. As a result, government agencies are filling positions with inappropriately educated personnel. Unfortunately, these same government agencies often carry the important role of regulating environmental quality and protecting human health by conducting technically complex programs mandated by Federal laws and regulations. To meet the estimated need for environmental health professionals, governments, industry, and academia must work together to foster additional academic program, including faculty and curricula development, and good accreditation processes for new and existing programs.

— Provide continuing education on treatment, control, and identification of environmental health hazards through national professional associations whose members have roles in the delivery of related services.

"Increasing the number of specialists in environmental health should be undertaken in conjunction with training in environmental health for physicians, generalists in medicine and engineering, and public school teachers. In addition, development and dissemination of toxicological and clinical information to practicing medical practitioners is needed through mechanisms such as the Case Studies in Environmental Medicine developed by the Agency for Toxic Substances and Disease Registry."
Discussion

The personnel needs component of the Healthy People 2000 document lends further weight to the need for adequately educated environmental health science and protection personnel essential to attain the various environmental health science and protection objectives of the report. This recommendation reaffirms the needs documented in the 1987 BHP report on environmental personnel shortages, and recommends “good accreditation processes for new and existing programs.” The issue of accreditation is discussed in Section IV., p. 52 of this report.

G. DEPARTMENT OF DEFENSE AND DEPARTMENT OF ENERGY COMMENTS.

1. Department of Defense (DOD) Deputy Assistant Secretary Thomas E. Baca has stated that the shortage of properly qualified environmental health science and protection professionals constitutes a major impediment to DOD’s world-wide mission of environmental problem prevention and clean-up.¹¹

2. Department of Energy (DOE) Secretary Watkins has charted a new course for DOE toward full accountability in the areas of environment, safety, and health to demonstrate that DOE is committed to complying with the Nation’s environmental laws and discharging its many responsibilities which include protecting public health and safety.¹² This includes strengthening the environmental,
safety, and health technical capabilities of line managers within DOE; and to do this, DOE officials need sufficient numbers of appropriate skilled DOE line managers to support them. Secretary Watkins has also greatly expanded emphasis on comprehensive epidemiological data on DOE and contractor employees.

H. Environmental Health Career Guidebook.

The Environmental Health Career Guidebook developed by the Association of Schools at Public Health (ASPH) and funded by the Bureau of Health Professions (BHPr) (HRSA Contract # 240-88-0062) describes professional level environmental health occupations, requirements, opportunities, and settings for employment; and graduate/undergraduate institutions offering environmental health science and protection degrees. It merits wide distribution to appropriate official agencies, universities, and professional associations. (See Appendix A.)
III. DESIRABLE GRADUATE ENVIRONMENTAL HEALTH SCIENCE AND PROTECTION OBJECTIVES

— Knowledge and understanding of the major sources of environmental insults.

— Knowledge of the physical, chemical, and biological characteristics involved in establishing materials as potentially dangerous.

— Knowledge of laws by which environmental problems are managed.

— Epidemiological and biostatistical principles basic to determining exposure, the environmental subsystems that provide concentrating points, and models for estimating environmental dispersion.

— Comprehension of the biological basis of injury for a given exposure to toxic materials and the resulting health effects.

— Understanding of the toxicology of common materials in the environment, models for assessing risk; and ability to use these models to perform risk assessment for exposure to such materials.

— The principles of managing controlled and abandoned waste sites, including groundwater evaluation, selection of remediation measures, and use of personal protection measures for potential and actual inhalation or ingestion of toxic materials.

— Familiarity with technologies used to treat and manage materials that may pose a hazard to humans or the environment; knowledge of technologies that may be applied to mitigate the occupational and community health and safety effects; and the design, effectiveness and cost of such techniques.

— Understanding of basic methods of measuring environmental media, requirements for sampling, sensitivity and reliability of analytical methods, and the proper determination of contaminants in the workplace.

— Risk communication, cost-effectiveness, and cost-benefit analysis with special attention to public concerns and public participation and an ability to communicate technical information consistent with public sensitivities.
— Knowledge of local, state, and federal environmental agencies and their responsibilities.

— Skills in collection, analysis, and interpretation of scientific data, and use of computers with modern information management systems.

— Ability to be effective in preventing environmental health science and protection problems through early and effective involvement in planning for energy issues, transportation, land-use, resource consumption.

— Knowledge of measures to mitigate global environmental health science and protection problems such as ozone depletion, global warming, acid precipitation, desertification, deforestation, and global toxification.

— Knowledge of the planning, development, and implementation of public policy.

— Ability to synthesize knowledge and skills on resolution of a special problem through research and application.

— Skills to effectively and equitably negotiate and resolve controversial environmental health science and protection problems.

— Recognition that environmental degradation may either directly or indirectly degrade human health and the economy, and that efforts need to be directed forward protecting these delicate environmental systems upon which human health ultimately depends.
IV. CREDENTIALING

Credentialing is the formal recognition of professional or technical competence. There are two distinct means of credentialing: (1) individual credentialing consisting of certification, registration, and licensure, and (2) institutional accreditation of education and training programs, colleges and universities. Certification is the process by which a nongovernmental agency or association grants recognition to an individual who has met certain predetermined qualifications specified by that agency or association. Registration is the acknowledgement by a governmental body that a person possesses a specific set of professional qualifications. Licensure is the process by which a government agency grants permission to an individual to engage in a given occupation upon finding that the applicant has attained the minimal degree of competency necessary to ensure that the public health, safety, and welfare will be reasonably well-protected. Accreditation is the acknowledgement that an educational institution or program maintains standards of education which qualify its graduates for admission to higher or specialized institutions, or for professional practice.

A. CERTIFICATION OF ENVIRONMENTAL HEALTH SCIENCE AND PROTECTION PERSONNEL

A number of groups grant recognition to environmental health science and protection personnel who have met specific qualification requirements. Such groups include the American Academy of Sanitarians and the American Academy of Environmental Engineering. Environmental health science and protection is such a diffuse, broad field that certification of all professionals within the field would not be reasonable.

B. REGISTRATION OF ENVIRONMENTAL HEALTH SCIENCE AND PROTECTION PERSONNEL

Given the fact that the field of environmental health science and protection requires the talents of scores of professionals (geologists, biologists, chemists, physicians, social scientists, physicists, engineers, attorney, planners, sanitarians, toxicologists, epidemiologists,
statisticians, risk assessment scientists, ecologists, meteorologists, etc), registration of all such personnel is impossible. Specific groups such as engineers and sanitarians are required to be registered according to varying requirements in different states. Sanitarian registration requirements are very diverse and many are voluntary measures. Some view sanitarian registration acts as measures to protect the profession, while others advocate such acts on the basis of protecting the public against unprofessional practice. Regardless, the vast majority of environmental health science and protection personnel are not subject to such measures.

C. LICENSURE OF ENVIRONMENTAL HEALTH SCIENCE AND PROTECTION PERSONNEL

With the exception of environmental engineers, environmental health physicians, environmental health attorneys, and occupational health nurses, most environmental health personnel are not required to be licensed. Licensing requirements for engineers, physicians, attorneys, and nurses relate more to their basic profession than to the field of environmental health science and protection.

D. ACADEMIC ENVIRONMENTAL HEALTH SCIENCE AND PROTECTION PROGRAM ACCREDITATION

Accreditation of schools of public health is conducted by the Council on Education for Public Health (CEPH). CEPH is a member of the Council on Postsecondary Accreditation (COPA) and is recognized by COPA as the council to accredit schools of public health. CEPH is also approved by the U.S. Office of Education.

Industrial hygiene programs are accredited by the Related Accrediting Commission (RAC) of the Accrediting Board for Engineering and Technology (ABET). ABET is also a member of COPA and is recognized by the U.S. Office of Education.

The National Environmental Health Science and Protection Accreditation Council accredits both undergraduate and graduate environmental health science and protection programs. The Council lists 22 accredited undergraduate and four graduate programs in 1991.
The National Environmental Health Science and Protection Accreditation Council is not a member of COPA, and is not recognized by the Office of Education. The Council commenced efforts in 1990 to be recognized by the Office of Education and to gain membership in COPA. The Council held a special work-session in January, 1991, to update the basic criteria and guidelines for the graduate and undergraduate environmental health science and protection programs. There are probably additional programs which will seek accreditation once approved and listed by the Office of Education and COPA. Accreditation of such program implies a quality program and is a valuable service for students, faculty, educational institutions, and employers.

"Accreditation...implies a quality program...."
V. REFERENCES


6. Public Health Faculty/Agency Forum Report. (To be published.)


APPENDIX
APPENDIX A

ENVIRONMENTAL HEALTH CAREER GUIDEBOOK—DISTRIBUTION

The Environmental Health Career Guidebook developed under HRSA contract number 240-88-0062 by the Association of Schools of Public Health merits wide distribution (with cover letter from Secretary, DHHS) to appropriate official agencies, universities, associations. These will include, but are not limited to, the following:

Federal agencies - Secretary, DHHS,
   Ass’t Secretary for Health, DHHS
   Administrator, HRSA, USPHS
   All I.H.S. Area Offices
   Director, Centers for Disease Control, USPHS
   Director, Agency for Toxic Substances and Disease Registry, USPHS
   Director, National Institute for Environmental Health Sciences, USPHS
   Surgeon General, USPHS
   All Chief Professional Officers, USPHS
   All Regional Health Directors, USPHS
   Administrator, Food and Drug Administration, USPHS

   Secretary, Department of Labor
   Administrator, Occupational Health and Safety Administration

   Secretary, Department of Defense
   Deputy Assistant Secretary for Environment, DOD

   Coast Guard

   Administrator, U.S. Environmental Protection Agency
   Associate Administrator for Regional Operations and State/Local Relations
   Associate Administrator for Communications and Public Affairs
Assistant Administrator for Policy, Planning, and Evaluation
Assistant Administrator for Air and Radiation
Assistant Administrator for Pesticides and Toxic Substances
Assistant Administrator for Water
Assistant Administrator for Solid Waste and Emergency Response
Regional Administrator, Boston
Regional Administrator, New York
Regional Administrator, Philadelphia
Regional Administrator, Atlanta
Regional Administrator, Chicago
Regional Administrator, Dallas
Regional Administrator, Kansas City
Regional Administrator, Denver
Regional Administrator, San Francisco
Regional Administrator, Seattle
Secretary, Department of Housing and Urban Development
Secretary, Department of the Interior
Council on Environmental Quality

State Agencies -
All State Health Departments
All State Environmental Health Directors (in State Health Departments)
All State “Environmental Protection Agencies”

Universities -
All Deans, School of Public Health
All Chairs, Environmental Health, in Schools of Public Health
All National Environmental Health Science and Protection Accreditation Council accredited environmental health programs.
All other “environmental health programs” listed in Professor Jack Hatlen’s project supported by contract number HRSA 88-454 (p.)
Career Counseling Offices, all Universities
Professional Associations -

National Environmental Health Association
Conference of Local Environmental Health Administrators
American Public Health Association
American Academy of Sanitarians
American Academy of Environmental Engineers
Association of Schools of Public Health
American Industrial Hygiene Association
National Association of County Health Officers
U.S. Conference of Local Health Officials
Association of State and Territorial Health Officials
All State Public Health Associations
All State Environmental Health Associations
Commissioned Officers Association of the USPHS

Accrediting bodies -

National Environmental Health Science and Protection Accreditation Council
Council on Education for Public Health
Related Accrediting Commission of the Accrediting Board for Technology
APPENDIX B

DRAFT

ENVIRONMENTAL HEALTH SCIENCE AND PROTECTION EDUCATION AND TRAINING ACT

SPECIAL PROJECTS

The Secretary of The Department of Health and Human Services, through the Health Resources and Services Administration, shall make grants and cooperative agreements to and enter into contracts with eligible entities to develop and expand the education and training of environmental health science and protection professionals for the following purposes:

1. Establishment and expansion of programs
2. Curriculum development
3. Faculty development
4. Establishment of an accreditation mechanism(s) that is recognized by the Department of Education
5. Development of arrangements between academic institutions and State/Local governments providing environmental health science and protection services
6. Establishment of regional or State systems for coordination of educational programs and the development of continuing professional education
7. Establishment of Environmental Health Science and Protection Institutes at a University in each state for purposes of research and service

No grant or cooperative agreement may be entered into under this section unless the application shall be submitted to peer review and approved by the Secretary. Such application shall be in such form, submitted in such manner, and contain such information, as the Secretary shall by regulation prescribe.
For the purposes of this section, the term “eligible entities” means entities which are:

1) schools, universities, or other educational entities which provide for environmental health science and protection professional education and training and which meet such standards as the Secretary may by regulation prescribe; within five years of enactment of this act, eligibility shall require all applicants to be accredited by an entity recognized by the Department of Education;

2) States, political subdivisions of States, or regional and other public bodies representing States or political subdivisions of States or both;

3) other public or non-profit private entities capable, as determined by the Secretary, of carrying out the project.

For purposes of this section, “environmental health science and protection” refers to programs designed to protect against factors such as air pollution, water pollution, drinking water contamination, radiation, toxic chemicals, solid wastes, injuries, noise pollution, food contamination, and other environmental problems which adversely impact health or environmental quality.

For the purposes of this section, an “environmental health science and protection educational program” is a baccalaureate or graduate program that prepares students for work in “environmental health science and protection” through a course of study that provides a public health core content and environmental health science and protection scientific components.

For the purpose of making awards under this section, __ percent of all funds appropriated under the following acts is authorized to be transferred to DHHS/HRSA.

**TRAINEESHIPS**

The Secretary may make grants, cooperative agreements, or contracts to public and non-profit entities which provide graduate and under-graduate education and specialized training in environmental health science and protection. The purpose is to provide traineeships to students and for the development and conduct of short-term training institutes.
Traineeships made under this section shall provide for tuition and fees and such stipends and allowances (including travel and subsistence expenses and dependency allowances) for the trainees as the Secretary may deem necessary.

No grant or cooperative agreement may be entered into under this section unless the application shall be submitted to peer review and approved by the Secretary. Such application shall be in such form, submitted in such manner, and contain such information, as the Secretary shall by regulation prescribe.

For the purposes of this section, the term “eligible entities” means entities which are:

(1) Schools, universities, or other educational entities which provide for environmental health science and protection professional education and training and which meet such standards as the Secretary may by regulation prescribe; within five years of enactment of this act, eligibility shall require all applicants to be “accredited by an entity recognized by the Department of Education”;

(2) States, political subdivisions of States, or regional and other public bodies representing States or political subdivisions of States or both;

(3) Other public or non-profit private entities capable, as determined by the Secretary, of carrying out the project.

For the purposes of this section, “Environmental health science and protection” refers to programs designed to protect against factors such as air pollution, water pollution, drinking water contamination, radiation, toxic chemicals, solid wastes, injuries, noise pollution, food contamination, and other environmental problems which adversely impact health or environmental quality.

For the purposes of this section an “environmental health science and protection educational program” is a baccalaureate or graduate program that prepares students for work in “environmental health science and protection” through a course of study that provides an environmental health core content and environmental health science and protection components. For the purpose of making awards under this section, ___ percent of all funds appropriated under the following acts is authorized to be transferred to DHHS/HRSA.