

EPA responsibilities for administering ecological regulations*

Peter R. Jutro^a and Thomas B. Carter^b

^a *Office of Research and Development, U.S. Environmental Protection Agency, Washington, DC 20460 (USA)*

^b *Science and Policy Associates, Inc., 1333 H Street, N.W., West Tower Suite 400, Washington, DC 20005 (USA)*

Abstract

The U.S. Environmental Protection Agency (EPA) historically has focused largely on the protection of human health. In recent years, however, the Agency has devoted greater attention to the ecological component of environmental problems. This paper analyzes EPA's authority to evaluate and implement ecological protection, and examines how the Agency uses that authority. The article also addresses the concept of ecological risk, and the relationship between environmental quality and sustainable economic development.

1. Introduction

Since the genesis of the modern environmental movement in the nineteenth century, a subtle dichotomy has existed between those who hold nature intrinsically worthy of protection for its own sake and those who believe that the value of natural resources can be measured only by Man's ability to enjoy or otherwise utilize them. Motivation aside, however, both schools of thought exhibited concern over destruction of natural systems.

The public health movement had begun independently, but following World War II, concern over the health effects of industrialization grew. Between 1948 and 1969, the United States government reacted to air and water pollution with new legislation, new institutions, and new programs. By 1969, the American environmental movement had become a significant political force, and it was in the context of the mood of that time that the U.S. Environmental Protection Agency (EPA) was established. In its first twenty years, the Agency focused much of its efforts on minimizing the human health impact of pollutants, while

* Paper presented at the Symposium on the Role of Environmental (Ecological) Assessment in the Management of Chemical Pollution, American Chemical Society 204th National Meeting, Division of Industrial & Engineering Chemistry, Washington, DC, August 26–28, 1992.

the federal government's activities in protecting non-human life continued to be undertaken by resource management agencies. The federal natural resource management agencies — among them the U.S. Fish and Wildlife Service, the Bureau of Land Management, the National Park Service, the National Oceanic and Atmospheric Administration (NOAA), and the U.S. Forest Service (USFS) — historically have attempted to balance their dual missions of protecting and utilizing natural resources. For example, while USFS manages its forests to ensure their viability, the historical justification for these activities is to achieve maximum yield for human use.

The same environmental movement that resulted in the formation of EPA has generated a commonality of purpose between the human health and ecological professions. This in turn has facilitated progress in dealing with many environmental problems. But another dichotomy exists within the ecological or conservation community [1]. Although one school of thought has argued that the goals of protecting nature and facilitating human use are mutually antithetical as a consequence of necessary tradeoffs between economic and environmental concerns, an increasing understanding that these goals may be mutually supportive is emerging. Scientists are providing information to support the belief that the delicate interlinkages among the complex natural systems within which man and other living things exist are also those upon which man ultimately depends.

The recognition of the importance of ecosystem function has encouraged a broader ecological approach to environmental protection and natural resource management. It has become increasingly apparent that both the Earth's resources and its capacity for absorbing human waste are limited in the context of current practices, and that measures to ensure the sustainability of natural systems upon which humans depend are essential for the continued health of the planet.

Recognizing and understanding the ecological significance of biotic and ecosystem variety is one approach to the issue of sustainability. Society's effort to prevent the loss of biodiversity — the Earth's variety and variability of ecosystems, species, and genotypes — is an element of ecological protection. In the sense that biodiversity serves as a metaphor for a functioning system, it produces the "physical circumstances that allow us to live and breathe on the Earth" [2]. At varying levels of intensity, each relevant federal agency, most states, and many sectors of private industry have made efforts to learn more about biodiversity so that they can better incorporate ecological considerations into their activities. To these efforts at ecological protection, EPA contributes through its research, regulatory, and policy-making activities.

2. EPA authority to undertake ecological protection

The U.S. EPA was formed in 1969 through a reorganization authorized by executive order; unlike many agencies, it has no organic statute defining its

TABLE 1

United States statutes granting EPA ecological protection authority

Statute	Passed	Last amended
Federal Insecticide, Fungicide, and Rodenticide Act	1947	1988
Federal Water Pollution Control Act (Clean Water Act)	1948	1987
Clean Air Act (originally Air Pollution Control Act)	1955	1990
Resource Conservation and Recovery Act (originally Solid Waste Disposal Act)	1965	1984
National Environmental Policy Act	1969	1988
Marine Protection, Research, and Sanctuaries Act	1972	1988
Endangered Species Act	1973	1988
Toxic Substances Control Act	1976	1988
Comprehensive Environment Response, Compensation, and Liability Act	1980	1986

activities. Accordingly the Agency takes its guidance and authority from an assortment of laws that cover a range of environmental concerns. Its authorities to regulate for ecological protection and conduct related research come from several of these statutes. Almost every statute affecting EPA “contains broad enough language to incorporate ecological concerns into EPA programs” and most statutes specifically addressing ecological concerns grant the Agency, either explicitly or by inference, authority to act [3]. Table 1 lists the sources of EPA’s statutory authority to undertake activities in ecological protection.

The Clean Water Act (CWA) [4] provides EPA with several different tools by which to protect ecological health. One of the objectives of the Act is to “... maintain the ... biological integrity of the Nation’s waters” [5]. The Act gives states primary responsibility for setting water quality standards, but requires EPA to approve these standards and impose federal standards on a state if necessary [6]. The Agency is also charged with oversight of the National Pollution Discharge Elimination System, by which states grant discharge permits [7]. Through its authority over standards and permits, EPA can ensure that a pollutant’s ecological impact is considered alongside human health effects in the formulation of state standards.

To encourage consistent consideration of ecological impact in the water quality standards, EPA has promulgated a guidance document on biological criteria for use by States and EPA regions in developing and implementing standards [8]. The Agency, in cooperation with the U.S. Fish and Wildlife Service, is also developing wildlife criteria for water quality standards.

The CWA and the related regulations require each state to maintain existing levels of water quality and call for the designation of Outstanding National Resource Waters (ONRW), in which no degradation of water quality is allowed [9]. EPA strives for ecological protection through its enforcement of the

adoption and implementation of these antidegradation provisions. The regulation controlling this enforcement calls for protection of "existing uses" of the water [10], which include uses by non-human species [11].

Two statutes authorize EPA to regulate ocean discharges through issuing permits: the CWA and the Marine Protection, Research, and Sanctuaries Act (MPRSA) [12], which applies to discharges further than three miles from shore. The language of each statute evinces the Congressional concern for non-human life; both require EPA to consider the effect of disposal of pollution on "... marine ecosystem diversity ..., and species and community population" changes [13]. The regulations implementing these provisions further clarify the ecological protection language found in the statutes [14].

These acts provide EPA with authority to protect oceanic and terrestrial ecosystems. Permit applicants can be required to produce studies showing the ecological impacts of their discharges, and EPA withholds permits if not satisfied with the assessments [15]. Congress reconfirmed its concern for maintaining the integrity of these Acts in 1988 when, after EPA lost a court battle in which it tried to prevent New York City from discharging sewage into the ocean [16], the MPRSA was amended to ban ocean dumping of sewage sludge and industrial waste entirely [17].

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) [18] establishes a regulatory framework by which EPA controls the use of pesticides. The requirement that all pesticides be registered with EPA gives the Agency an opportunity to conduct a risk-benefit analysis of the pesticide's harm to the environment [19]. The FIFRA program recognizes the non-human health effects of pollutants, requiring all manufacturers to submit data showing the effect of pesticides on wildlife, aquatic organisms, plants, and non-target insects [20]. The EPA denies registration to pesticides causing plant and animal mortality, interpreting such impact as "unreasonable adverse effect" under the Act [21].

The Resource Conservation and Recovery Act (RCRA) [22] controls the regulation of solid and hazardous waste management. The Act authorizes EPA to set standards and issue permits for treatment, storage, and disposal of such wastes. When issuing permits, EPA may consider all potential environmental impacts of the facility [23] and must specifically take into consideration any impact on endangered species [24].

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) [25] addresses the problem of hazardous waste site cleanup. In accordance with its mandate to perform all duties required under the Act, EPA developed the Hazard Ranking System (HRS) by which to select sites for the National Priorities List (NPL) [26]. Only NPL sites receive money from the Hazardous Substance Response Trust Fund (Superfund), the Congressionally established vehicle for financing the cleanup of abandoned or illegal hazardous waste sites [27].

Traditionally the HRS has focused on human health impacts, but recent changes have been aimed at correcting the underestimation of serious ecologi-

cal risks. In 1990, the HRS was revised to allow non-human environmental threats alone to qualify a site for remedial funding [28]. The revisions also include marine sanctuaries, national parks, wilderness areas, and wildlife refuges as sensitive environments [29]. With these changes, the hazardous waste site selection authority provides EPA with further ecological protection powers.

The Agency has been active in the consideration of impacts to sensitive ecosystems in its ranking of hazardous waste sites under CERCLA. Almost one fourth of the 52 sites ranked since the 1990 HRS revisions were given non-human impact scores sufficient to qualify for inclusion on the National Priorities List [30].

The Toxic Substance Control Act (TSCA) [31] allows EPA to regulate the use of chemicals that pose a risk of injury to health or the environment. The statute's concern for ecological health is clear, as it defines environment as including "... the interrelationship which exists among and between water, air and land all living things" [32]. This language gives EPA broad authority to regulate the ecological threats of toxics.

For each chemical regulated under TSCA, EPA conducts an environmental hazard assessment identifying the chemical's effects on non-human life at the population, community, and ecosystem levels [33]. This hazard profile is considered — along with governmental policy, relative risk factors, and the results of an economic assessment — in determining whether a chemical presents an unreasonable risk and thus should be controlled under the Act [34].

The Environmental Protection Agency is given broad authority to address airborne ecological threats in the Clean Air Act (CAA) [35], which directs the Agency to establish primary and secondary National Ambient Air Quality Standards (NAAQS) [36]. Primary standards reflect the direct human impact of a pollutant, while the secondary standards are designed to protect public welfare, which is defined by the statute to include the health of plants [37]. Secondary air quality standards, however, are not given as much weight in setting limits on a pollutant as are the primary standards [38].

The Act also establishes Federal class I areas, including "national parks, national wilderness areas, national monuments, national seashores, and other areas of special ... natural ... value," [39], in which EPA is to ensure strict limitations on any airborne pollutants. The Agency is also charged with providing the states with guidelines for protecting visibility in Federal class I areas [40].

The 1990 amendments to the CAA require EPA to conduct a study to determine the feasibility of developing and implementing acid deposition standards designed to protect sensitive ecosystems [41]. The study is still in the planning phase [42].

The National Environmental Policy Act (NEPA) [43] requires each federal agency to prepare an Environmental Impact Statement (EIS) for each major action significantly affecting the environment. The Council on Environmental Quality (CEQ) has expanded the notion of "environment," in the context of NEPA's goals, to include non-human health [44].

While NEPA itself does not mandate EPA approval of EISs, the Clean Air Act requires EPA to comment on the environmental impact of any matter related to its responsibilities in any major federal agency action subject to NEPA, as well as in any legislation or regulation proposed by a federal agency [45]. The broad language of the Clean Air Act authorizes EPA to examine a wide range of federal agency activities to ensure the consideration of ecological impact. The majority of EPA's involvement in "major federal actions," as defined by NEPA, takes place under the authority granted by the CAA. The provision also enables EPA to intervene in instances governed by statutes that grant EPA no direct authority, such as the Historic Preservation Act. The Agency is moving increasingly toward giving ecological and direct human impacts equal priority in assessing federal actions [46].

The Endangered Species Act (ESA) [47] mandates specific measures to protect plant and animal species in danger of extinction. A provision of the Act requires all federal agencies to "utilize their authority in furtherance of the purposes of the [the Act] by carrying out programs for the conservation of..." endangered species [48]. With this duty to conserve rare species, EPA has the authority to protect non-human biota in situations where no other law or ESA provision explicitly generates obligations. Different offices of EPA have individual interpretations of the ESA conservation provision; however, the development, in consultation with the U.S. Fish and Wildlife Service, of agency-wide species protection standards has been discussed [49].

In general, the United States Supreme Court has given the Agency broad discretion in interpreting ambiguous laws, requiring only that their interpretation is "based on a permissible construction of the statute" [50]. The vague environmental protection authority granted EPA in several statutes gives the Agency a wide array of opportunities to play a significant role in ecological protection.

3. EPA research and assessment of ecological health

EPA is given broad general research authority under the Environmental Research and Development Act [51]. Most of the other statutes affecting the Agency also grant more specific authority to conduct research. Both the Clean Air Act and the Clean Water Act contain research mandates for EPA. The Clean Water Act charges the Agency to "... conduct research on the harmful effects on the health and on the welfare of persons caused by pollutants in the water" [52]. As in several other statutes, the term "welfare" includes broader ecological concerns, such as biological impact [53]. The Act also empowers EPA to authorize and administer research grants [54]. The Clean Air Act authorizes EPA to "collect and disseminate ... basic data on chemical, physical, and biological effects of varying air quality ..." [55]. This authority gives the Agency an opportunity to focus research on ecological protection.

The intensity of EPA's ecological research activities has increased since the 1990 release of *Reducing Risk* [56]. In the report, the EPA Science Advisory Board (SAB) recommended that the Agency "attach as much importance to reducing ecological risk as it does to reducing human health risk" [57]. In prioritizing risks to the natural ecology and human welfare, the SAB listed habitat alteration and loss of biodiversity as two of the four highest-risk problems [58].

In response to *Reducing Risk*, EPA is refocusing its ecological research strategy to set priorities for environmental risk reduction [59]. The Agency's Office of Research and Development (ORD) has developed an Ecological Risk Assessment Program to assess the risk to environmental resources at the ecosystem level [60]. The Program, in which NOAA and the U.S. Departments of Agriculture and Interior are cooperating, is intended to provide the scientific underpinning for developing policies for ecological sustainability [61].

The Agency expects that much of the information for the Program's initial goal of developing methods for assessing ecosystem-level responses to stresses will be provided by its Environmental Monitoring and Assessment Program (EMAP). Designed by EPA to identify areas most affected by environmental stress and to evaluate the effectiveness of regulatory efforts to sustain ecological resources, EMAP monitors biological, chemical, and physical indicators of ecological response to environmental stress [62]. EMAP — and the risk assessment strategy it will serve — are indicative of an evolution in concern from species and population levels to the ecosystem and regional levels of biological organization.

The Agency is also active in conducting research on climate change, a problem which may have profound ecological implications. Long-term changes in temperature and rainfall could radically alter the nature of biological communities. The speed of climate change, the presence of man-made and geological barriers, soil composition, as well as a host of other factors could prevent plants and animals from simply migrating to keep pace with a changing environment [63]. Furthermore, there is evidence that living organisms — aside from humans — themselves have an impact on climate; such biofeedbacks may come from many sources, among them CO₂-consuming forests and algae blooms, greenhouse gas-producing wetlands [64], as well as oceanic plankton, certain species of which may contribute to the depletion of tropospheric ozone [65]. The Agency has initiated research efforts aimed at improving understanding of the interrelationships between climate and natural biological systems.

4. Other EPA ecological activities

There are many other ecologically related activities in which EPA participates. Domestically, the Agency participates in the U.S. Man and the

Biosphere Program, which supports research aimed at interdisciplinary natural and social science approaches to environmental problems, and serves as the administrative nexus for the 47 Biosphere Reserves located in the United States. To encourage the examination of biodiversity impacts in fulfilling the requirements of NEPA, EPA and CEQ held a series of public roundtable discussions around the United States. Through its Great Waters Program, EPA is active in efforts to preserve the ecological integrity of the Chesapeake Bay, Puget Sound, the Great Lakes, and the San Francisco Bay. The Agency also initiated the interagency Biodiversity Uncertainties and Research Needs Project, designed to identify the biodiversity information needs of decision makers and assess research opportunities for meeting those needs, thus providing guidance for research investment decisions.

Furthermore, EPA is involved in a variety of international ecological activities. The Agency is working on the development of the United States proposal for international biodiversity surveys, inventories, and data managements, announced at the June 1992 U.N. Conference on Environment and Development (UNCED) in Rio de Janeiro, Brasil. The Agency also was heavily involved in the development of Forest Principles for UNCED and has negotiated many bilateral and multilateral agreements on a wide range of ecological issues. "Partners in Flight" is an international program directed toward protecting neotropical migratory birds, in which EPA participates.

5. Conclusions

Through its regulatory, research, and policy endeavors, EPA is fulfilling its role in the protection of ecological health. One commentator has observed that, in most cases of ecological regulation, "the only hurdle for EPA to overcome when addressing ecological risks is the willingness of the Agency to act with consistency and foresight to overcome the inertia of past implementation practices" [66]. Most of these opportunities have been recognized and are now being exploited.

At the same time, however, EPA recognizes information is lacking on both how ecological processes operate and how to conduct human activities with minimum detrimental impact on these systems. Efforts are underway within EPA and elsewhere to direct research efforts toward these topics. This research will be important in understanding human dependence on the complex ecological structure that links all living things. By increasing the understanding, recognition, and appreciation of the importance of ecosystem functions to human welfare, the Agency can help underscore the mutual dependence of environmental quality and economic development. Our overarching need is for society to find ways to conduct its activities in a manner that does not detract from the welfare of future generations. An ecological perspective may provide the organizing construct within which this can be planned and undertaken.

Acknowledgment

The views represented in this paper are those of the authors and do not necessarily represent those of the United States Environmental Protection Agency.

References

- 1 P.R. Jutro, Biological diversity, ecology, and global climate change, *Environ. Health Perspect.*, 96 (1991) 169.
- 2 H. Gee, The objective case for conservation, *Nature*, 357 (1992) 639.
- 3 R.L. Fischman, Biological Diversity and Environmental Protection: Authorities to Reduce Risk, *Environmental Law*, Northwestern School of Law of Lewis and Clark College 1992, p. 440.
- 4 The Federal Water Pollution Control Act, 33 U.S.C. §§ 1251–1387, St. Paul, MN, 1988.
- 5 *Id.* §1251(a)(1).
- 6 *Id.* § 1313(c).
- 7 *Id.* § 1342.
- 8 U.S. Environmental Protection Agency, Biological Criteria: National program guidance for surface waters, EPA-440/5-90-004, Washington, DC, 1990.
- 9 CWA Regulations, 40 C.F.R. § 131.12(a)(3), St. Paul, MN, 1991.
- 10 *Id.* § 131(e).
- 11 U.S. Environmental Protection Agency, Questions and Answers on Antidegradation, Washington, DC, 1985.
- 12 The Marine Protection, Research, and Sanctuaries Act, 33 U.S.C. §§ 1401–1445, St. Paul, MN, 1988.
- 13 CWA and MPRSA, 33 U.S.C. §§ 1343(c)(1), 1412, St. Paul, MN, 1988.
- 14 MPRSA Regulations, 40 C.F.R. §§ 220–228, St. Paul, MN, 1991.
- 15 *Id.* § 227.6(d).
- 16 *City of New York vs. EPA*, 15 Environmental Rep. Cas., New York, 1981.
- 17 MPRSA, 33 U.S.C.A. § 1414(b), 1988.
- 18 The Federal Insecticide, Fungicide, and Rodenticide Act, 7 U.S.C. §§ 136–136y, St. Paul, MN, 1988.
- 19 *Id.* § 136a(c)(5).
- 20 FIFRA Regulations, 40 C.F.R. §§ 158.490–590, Washington, DC, 1991.
- 21 D. Urban, Personal communication, Ecological Effects Branch, Office of Pesticides and Toxic Substances, U.S. EPA, Washington, DC, 1992.
- 22 The Resource Conservation and Recovery Act, 42 U.S.C. §§ 6901–6991k, Washington, DC, 1984.
- 23 *Id.* § 6925(c)(3).
- 24 RCRA Regulations, 40 C.F.R. § 270.3(c), St. Paul, MN, 1991.
- 25 The Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601–9675, St. Paul, MN, 1988.
- 26 Executive Order 12,316, 46 Fed. Reg. 42,237, Washington, DC, 1981.
- 27 CERCLA Regulations, 40 C.F.R. §§ 158.490–590, St. Paul, MN, 1991.
- 28 Hazard Ranking System, 55 Fed. Reg. 51,532, Washington, DC, 1990.
- 29 *Id.* 51,624.
- 30 S. Wells, Analysis of revisions to the hazard ranking system, Presented at Air and Waste Management Association 85th Annual Meeting and Exhibition, Kansas City, MO, June 21–26, 1992.
- 31 The Toxic Substances Control Act, 15 U.S.C. §§ 2601–2671, St. Paul, MN, 1988.

- 32 *Id.* §§ 2602, 2604.
- 33 J.V. Nabholz, Environmental hazard and risk assessment under the United States Toxic Substances Control Act, *Sci. Total Environ.*, 109/110 (1991) 649–665.
- 34 *Id.*, pp. 664–665.
- 35 The Clean Air Act, 42 U.S.C.A. §§ 7401–7671, West Suppl., St. Paul, MN, 1991.
- 36 *Id.* § 7409(b)(2).
- 37 *Id.* §§ 7409(a)(1)(B), 7602(h).
- 38 J. Haynes, Personal communication, Standards Development Branch, Office of Air and Radiation, U.S. EPA, Washington, DC, 1992.
- 39 The Clean Air Act, 42 U.S.C. § 7470(2), St. Paul, MN, 1988.
- 40 *Id.* § 7491.
- 41 *Id.* § 7651 note.
- 42 L. Montgomery, Personal communication, Acid Rain Division, Office of Air and Radiation, U.S. EPA, Washington, DC, 1992.
- 43 The National Environmental Policy Act, 42 U.S.C. §§ 4321–4370, St. Paul, MN, 1988.
- 44 The Council on Environmental Quality, *Environmental Quality: Twenty-First Annual Report*, Washington, DC, 1991.
- 45 The Clean Air Act, 42 U.S.C. § 7609(a), St. Paul, MN, 1988.
- 46 J. Serfis, Personal communication, Office of Federal Activities, U.S. EPA, Washington, DC, 1992.
- 47 The Endangered Species Act, 16 U.S.C. §§ 1531–1544, St. Paul, MN, 1988.
- 48 *Id.* § 1536(a)(1).
- 49 J. Serfis, Personal communication, Office of Federal Activities, U.S. EPA, Washington, DC, 1992.
- 50 *Chevron U.S.A., Inc. vs. Natural Resources Defense Council, Inc.*, 467 U.S. 837, St. Paul, MN, 1984.
- 51 The Environmental Research and Development Act, 42 U.S.C. §§ 4363, 4369, 4370, St. Paul, MN, 1980.
- 52 The Clean Water Act, 33 U.S.C. §§ 1254a, St. Paul, MN, 1988.
- 53 *Id.* § 1254(b)(6).
- 54 *Id.* § 1255(d)(3).
- 55 The Clean Air Act, 42 U.S.C.A. § 7403(b)(6), West Suppl., St. Paul, MN, 1991.
- 56 U.S. Environmental Protection Agency, *Reducing Risk: Setting Priorities and Strategies for Environmental Protection*, SAB-EC-90-021, Washington, DC, 1990.
- 57 *Id.*, p. 6.
- 58 *Id.*, p. 13.
- 59 F.W. Kutz, R.A. Linthurst, C. Riordan, M. Slimak and R. Frederick, Ecological research at EPA: New directions, *Environ. Sci. Technol.*, 26 (1992) 860.
- 60 *Id.*, p. 862.
- 61 *Id.*, p. 862–863.
- 62 *Id.*, p. 863.
- 63 P.R. Jutro, p. 169 in ref. [1].
- 64 *Id.*, p. 168.
- 65 J. Bedford, Methyl bromide and natural sources of organobromine: Impact on arctic ozone depletion (in preparation).
- 66 R.L. Fischman, p. 440 in ref [3].