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RACE, GENDER, AGE, AND DISPROPORTIONATE IMPACT: WHAT CAN WE DO ABOUT THE FAILURE TO PROTECT THE MOST VULNERABLE?

Samara F. Swanston†

I. Introduction

Hard economic times and social conditions are driving a reordering of environmental protection priorities that threatens to sacrifice the most vulnerable groups.¹ Environmental regulatory agencies acknowledge that vulnerable populations face the greatest risk of harm from environmental insult and that these groups are not adequately protected. Although a risk-based prioritization² of resources benefits the greatest number of people, such allocation would disadvantage minority communities, which contain disproportionate numbers of sensitive subgroups. Our regulatory bodies must therefore develop new strategies to adequately protect sensitive subgroups identified in minority communities. Part II of this Article looks at some of the considerations that influence the health protection priorities and resource allocations that environmental regulatory agencies make. Part III examines the importance of variation in susceptibility to environmental insult and how minorities, women, and the young are particularly affected. Part

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1. See, e.g., William Reilly, *Why I Propose a National Debate on Risk*, EPA J., Mar./Apr. 1991, at 2, 4. "Obviously many factors go into shaping priorities—the values and perceptions of the American people, the constraints of the economy, the culture of governance . . ." *Id.* at 3.

2. See *infra* note 18. The Environmental Protection Agency's Science Advisory Board identified the absence of a correlation between EPA budget resources and the relative risk of the environmental problem the resources were intended to address. See SCIENCE ADVISORY BOARD, U.S. ENVTL. PROTECTION AGENCY, REDUCING RISK: SETTING PRIORITIES FOR ENVIRONMENTAL PROTECTION 20 (1990) [hereinafter REDUCING RISK]. That report and subsequent policies developed pursuant to the report within EPA and within the Office of Management and Budget have played a key role in the prioritization of the Agency's resources to focus on cases of greatest relative risk as ranked by the Science Advisory Board.

IV discusses the economic rationale and available mechanisms for protecting vulnerable subgroups.

II. Major Considerations That Shape Environmental Health Protection Priorities of Regulatory Agencies

A. The Emergence of Risk Based Prioritization

Environmental regulatory agencies are charged primarily with the duty to protect public health and the environment. The Environmental Protection Agency (EPA), for example, protects public health by overseeing the implementation of fourteen major laws that Congress has passed to protect the environment.³ EPA programs are devoted to the control of pollution in specific media such as air, water, or soil, through regulation of the manufacture, distribution, and use of hazardous substances and the clean-up of solid and hazardous waste sites.⁴ State and local agencies also administer statutes which manage pollution by addressing contaminated media.⁵

Unfortunately, the public health protection provided by environmental regulatory agencies is hard to measure. The legislation⁶ that created the EPA programs does not generally authorize collection and consideration of information on potentially exposed populations to ascertain whether health protection goals have been

3. See U.S. ENVTL. PROTECTION AGENCY, PRESERVING OUR FUTURE TODAY 3 (1991). The fourteen statutes are: Clean Air Act, 42 U.S.C. §§ 7401-7642 (1988); Clean Water Act of 1977, 33 U.S.C. §§ 1251-1287 (1988 & Supp. 1992); Safe Drinking Water Act 42 U.S.C. §§ 300f-300j-26 (1988); Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. §§ 9601-9675 (1988 & Supp. 1992); Emergency Planning and Community Right-To-Know Act of 1986, 42 U.S.C. §§ 11001-11050 (1988); Resource Conservation and Recovery Act of 1976, 42 U.S.C. §§ 6901-6992k (1988); Federal Insecticide, Fungicide and Rodenticide Act, 7 U.S.C. §§ 136-136y (1988 & Supp. 1992); Toxic Substances Control Act, 15 U.S.C. §§ 2601-2671 (1988); Marine Protection, Research, and Sanctuaries Act of 1972, 16 U.S.C. §§ 1431-1447b (1988); Ocean Dumping Ban Act of 1988, 33 U.S.C. §§ 1401-1445 (Supp. 1992); Uranium Mill Tailings Radiation Control Act of 1978, 42 U.S.C. § 7901 (1988); Indoor Radon Abatement Act, 15 U.S.C. § 2661 (supp. 1994); Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464 (1988); Pollution Prevention Act of 1990, 42 U.S.C. §§ 13101-13109 (1994).

4. 2 U.S. ENVTL. PROTECTION AGENCY, ENVIRONMENTAL EQUITY: REDUCING RISKS FOR ALL COMMUNITIES 16 (1992) [hereinafter ENVIRONMENTAL EQUITY].

5. For example, New York State addresses contaminated inactive hazardous waste sites through the state Inactive Hazardous Waste Site program, N.Y. ENVTL. CONSERV. LAW §§ 27-0101 to 27-1701 (McKinney 1984 & Supp. 1994), and many federal pollution control programs are delegated to the states, such as the SPDES program under the Clean Water Act. Local municipalities also administer programs designed to address solid waste and sewage disposal.

6. See sources cited *supra* note 3.

achieved. In fact, in at least one case, EPA guidance specifically excludes reliance on exposure biomarkers when deciding among regulatory alternatives designed for health protection unless that information is already available.⁷ Even when legislation requires an agency to collect health information about exposed populations, the data collection may often be inadequate. For example, the Superfund Amendments of 1986 require the Agency for Toxic Substances and Disease Registry (ATSDR) to conduct health assessments of National Priorities List (NPL) sites,⁸ yet a 1991 United States General Accounting Office review of ATSDR's work and a 1992 review by two citizens groups⁹ found that the agency often used health assessments¹⁰ or old data as the basis for its assessments without obtaining any additional information or conducting site visits. A May 1992 report, *Inconclusive By Design*, concluded that ATSDR had inadequate contact with the exposed populations, relied too heavily on epidemiological studies, used inappropriate testing techniques, and focused on the wrong problems.¹¹

As a result of this deficient data gathering, the EPA cannot say whether or not use of a certain pesticide¹² or a hazardous waste site, for example, poses human health risks.¹³ According to a Na-

7. OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE, U.S. ENVTL. PROTECTION AGENCY, OSWER No. 9355.4-02, INTERIM GUIDANCE ON ESTABLISHING SOIL LEAD CLEANUP LEVELS (1989).

8. The National Priorities List, developed as a result of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), is a list of the approximately 1200 worst hazardous waste sites in the country.

9. Karen Breslin, *In Our Own Backyards: The Continuing Threat of Hazardous Waste*, 101 ENVTL. HEALTH PERSP. 484, 485 (1993). The groups which critically reviewed the performance of ATSDR were the National Toxics Campaign Fund and the Environmental Health Network.

10. *Id.* Health assessments by ATSDR are based upon environmental data, such as sampling results provided by EPA, health outcome data such as birth and death records or cancer or disease registries when available, and when available, community health concerns.

11. *Id.*

12. Ivette Perfecto & Baldemar Velasquez, *Farm Workers Among the Least Protected*, EPA J., Mar./Apr. 1992, at 13. EPA acknowledges that of the approximately 35,000 different commercial pesticide formulations, less than 10% in current use have been fully tested for adverse health effects and that "full safety assurance [was only available] for six." *Id.*

13. U.S. Env'tl. Protection Agency, *Major New Study Questions EPA's Ability to Rank Superfund Site Risks*, INSIDE EPA WEEKLY REPORT, Nov. 1991, at 1, 8-9 (Nov. 1991) (citing NATIONAL RESEARCH COUNCIL, ENVIRONMENTAL EPIDEMIOLOGY: PUBLIC HEALTH AND HAZARDOUS WASTES; the NRC is the research arm of the National Academy of Sciences). *But see*, Sandra A. Gechwind et al., *Risk of Congenital Malformations Associated with Proximity to Hazardous Waste Sites*, 135 AMER. J. OF EPIDEMIOLOGY 1197, 1202-06 (1992); Breslin, *supra* note 9, at 485.

tional Research Council study, a determination of whether Superfund or other hazardous waste programs actually protect human health requires information on the scope of potential and actual human exposures and the health effects that could result from those exposures.¹⁴ Some studies, however, have successfully documented the effects of some environmental insult, such as waste sites, on the population. For example, the New York State Department of Health has evaluated the relationship between residential proximity to hazardous waste sites and congenital malformations or birth defects. The study showed a statistically significant increase in birth defects correlated with maternal residence near toxic waste sites.¹⁵

Following its own review, the EPA's Science Advisory Board (SAB), which was created to provide independent scientific advice to the EPA, concluded in 1990 that hazardous waste, pesticides, and airborne toxins do not represent high risk problems, while global climate change, loss of biodiversity, and stratospheric ozone depletion present greater risks.¹⁶ The EPA had previously downplayed the risk from hazardous waste sites in 1987.¹⁷ In 1990, however, the Science Advisory Board, consistent with its conclusions, recommended risk based prioritization¹⁸ of environmental

14. U.S. Env'tl. Protection Agency, *supra* note 13, at 8-9.

15. *Id.* According to Barry Johnson, Assistant Administrator of the Agency for Toxic Substances and Disease Registry, "[d]ata from Superfund sites suggest that proximity to hazardous waste sites is associated with a 'small to moderate increased risk of some kinds of birth defects' and some types of cancers though the cancer association is 'less well documented.'" Breslin, *supra* note 9, at 484. A very recent study, however, has preliminarily identified a correlation between proximity of residence to hazardous waste sites and increased risks of breast cancer and other cancers. Samuel S. Epstein, *Environmental and Occupational Pollutants Are Avoidable Causes of Breast Cancer*, 24 INT'L J. HEALTH SERVS. 145, 147 (1994).

16. REDUCING RISK, *supra* note 2, at 13; app. A, at 50-52 (active and inactive waste sites), 60-61 (pesticides); App. B, at 56-58 (airborne toxins). The SAB report, per its Human Health Subcommittee, reached its conclusions about the risks of hazardous waste sites with little reliance on data of human exposure. See REDUCING RISK, app. B, at 56.

17. See Frederick W. Allen, *The Situation: What the Public Believes—How the Experts See It*, EPA J., Nov. 1987, at 9, 9-12; Peter M. Sandman, *Risk Communication: Facing Public Outrage*, EPA J., Nov. 1987, at 21, 21-22.

18. Risk based prioritization involves a comparative analysis of the risk to human health and the environment posed by different environmental problems. Ecological and human health risks are then ranked, and resources allocated, in a manner intended to achieve the greatest risk reduction. For a discussion of EPA's Comparative Risk Analysis Initiative, see generally, Donald T. Hornstein, *Reclaiming Environmental Law: A Normative Critique of Comparative Risk Analysis*, 92 COLUM. L. REV. 562 (1992).

threats.¹⁹ Risk prioritization would allow the agency to address global warming or stratospheric ozone depletion and, arguably, do less hazardous-waste management and remediation.²⁰ Armed with the reassurances of scientists that this new focus would be the best way to get the most results from limited public resources, and well aware that the true human health risks of hazardous waste, pesticides, or most airborne toxins and chemicals²¹ are not known,²² EPA has embarked upon a concerted effort to reorder priorities and reduce or eliminate certain existing environmental protection initiatives.

Reordering environmental protection priorities, without adequate substantiation that the resources devoted to the prior programs were not necessary to protect human health,²³ is all too easy. The primary reason for this ease is that courts will not generally delve into all the available scientific evidence in cases of scientific uncertainty.²⁴ Another important reason is that the EPA accords less weight to public environmental health concerns than it does to the pronouncements of scientists²⁵ or groups like the EPA Science Advisory Board. Most importantly, the reordering of environmental protection priorities may be more easily accomplished precisely because recent studies have shown that minorities are disproportionately exposed to pollutants like hazardous waste,²⁶ pesticides,²⁷

19. D. Warner North et al., *Forum Two: Do We Know Enough to Take a Risk Based Approach?*, EPA J., Mar./Apr. 1991, at 31, 32-33.

20. *Id.*

21. 13 U.S. DEP'T OF HEALTH & HUMAN SERVS., PUBLIC HEALTH REPORT 1984, at 99, 532-38 (1984). Of the five million chemical compounds which have been isolated or synthesized, more than 55,000 are produced commercially and 350 new compounds are released into commerce annually. However very "few of the thousands of commercially important chemicals have been subjected to extensive toxicity testing and most have scarcely been tested at all." According to the Department of Health and Human Services, identifying which substances are toxic and determining the severity of the risk they present is an enormous task which will take decades. At present, definitive answers cannot be given about the extent of risk to the public from exposure to toxic chemicals.

22. *But see supra* notes 12-15 and accompanying text.

23. *See* Hornstein, *supra* note 18, at 564-65, 592-94 (questioning the basic legality of substituting one form of approaching risk for another in derogation of certain moral goals set for the Agency).

24. ZYGMUNT J.B. PLATER ET AL., ENVIRONMENTAL LAW AND POLICY: NATURE, LAW AND SOCIETY 79 (1992).

25. David Durenberger, *A Dissenting Voice*, EPA J., Mar./Apr. 1991, at 49, 50; Hornstein, *supra* note 18, at 564.

26. Samara F. Swanston, *Legal Strategies for Achieving Environmental Equity*, 18 YALE J. INT'L L. 337 (1993).

27. Perfecto & Velasquez, *supra* note 12, at 13-14.

or airborne toxins.²⁸ There is an apparent correlation between the institutional awareness that hazardous waste sites disproportionately burden minority communities and the thrust to reorder environmental protection priorities. In 1987 the groundbreaking report by the United Church of Christ, *Toxic Wastes and Race in the United States*, highlighted the relationship between hazardous waste disposal activities and race. That same year the EPA suggested for the first time that hazardous waste sites did not present such a great risk. Furthermore, traditionally disempowered groups may not have the political clout with regulatory agencies²⁹ to prevent resource reallocation from an area in which they clearly shoulder an inequitable burden to an area like stratospheric ozone depletion, an equally important area that does not present risk unique to minorities.

B. Economic Considerations

Economic considerations provide seductive and powerful justifications for the decision to prioritize environmental protection spending despite indications that minorities and vulnerable populations might be "sacrificed" as a result.³⁰ Prioritization attempts to maximize the benefits of the public and private sector costs of environmental protection by protecting the greatest aggregate number of people.³¹ Environmental regulations already require a balancing of cost against risk³² in a sobering and highly speculative exer-

28. D.R. Wernette & L.A. Nieves, *Breathing Polluted Air*, EPA J., Mar./Apr. 1992, at 16, 16-17.

29. "Historically minority communities . . . were seen as the paths of least resistance. They became likely targets for . . . a host of polluting industries. . . . A [1984] report commissioned by the California Waste Management Board advised the state . . . that [it was] 'less likely to meet resistance in a community of low-income, blue collar workers with a high school education or less.'" Robert D. Bullard & Beverly H. Wright, *Environmental Justice for All: Community Perspectives on Health and Research Needs*, 9 TOXICOLOGY AND INDUS. HEALTH 821, 822-23 (1993).

30. Hornstein, *supra* note 18, at 598-604.

31. REDUCING RISK, *supra* note 2, at 20 (noting the lack of a correlation between the relative risk of an environmental problem and the EPA budget resources dedicated to reducing it). Some of the major recommendations of the report included that EPA should target its environmental protection efforts on the basis of opportunities for the greatest risk reduction, that EPA should attach as much importance to reducing ecological risk as it does to reducing human health risk, and that EPA should reflect risk-based priorities in its budget process. According to the Office of Management and Budget, EPA's mission in risk reduction is to focus the agency's limited resources on cases of greatest risk. OFFICE OF MANAGEMENT AND BUDGET, REGULATORY PROGRAM OF THE UNITED STATES GOVERNMENT 441 (1991).

32. See, e.g., National Oil and Hazardous Substances Contingency Plan, 40 C.F.R. § 300.430(e)(2)(G)(i) (1990). The overall protection of human health and the environ-

cise. Directives on the promulgation of regulations already require consideration of the regulations' impact on both affected industries and the national economy, and mandate that the potential benefits to society outweigh the potential costs.³³ Cost effective public health protection by regulatory agencies necessarily sacrifices those individuals most expensive to protect. These individuals are in groups that fall within the range of acceptable risk and thus remain the most vulnerable.³⁴ Despite prioritization's injurious effect on minorities and vulnerable populations, the EPA has begun to allocate more funds to the greatest environmental risks that comparative assessments of relative risk identify.³⁵

C. Lack of Scientific Certainty

As both a scientific and a regulatory agency, EPA is under considerable pressure from congressional, advocacy, and business groups to establish that its public health decisions are scientifically supported. The EPA carries out relevant scientific research to "ensure that regulatory and policy decisions are based upon sound scientific information."³⁶ Nevertheless, EPA decisions are plagued by data and information gaps, often because the specific measurements or studies that would complete an assessment are missing, and sometimes because of a general lack of understanding about scientific data.³⁷ Institutional biases or investments in a particular assessment model, such as the uptake biokinetic model for assessing environmental contamination from lead,³⁸ hinder use of more

ment including short and long term unacceptable risks must be evaluated against the capital, operation, and maintenance costs of the remedial projects.

33. Exec. Order No. 12,291, 46 Fed. Reg. 13,193 (1981).

34. Hornstein, *supra* note 18, at 607.

35. U.S. ENVTL. PROTECTION AGENCY, PRESERVING OUR FUTURE TODAY 18 (1991).

36. NATIONAL INST. OF ENVTL. HEALTH SCIENCES, 98 ENVTL. HEALTH PERSP. 235, 235-41 (1992).

37. Dorothy E. Patton, *The ABCs of Risk Assessment*, EPA J., Jan.-Mar. 1993, at 10, 14.

38. The EPA uses the Lead Uptake Biokinetic Model because its traditional method for evaluating a non-carcinogenic environmental contaminant, by comparing the chronic daily intake from a single media to the threshold dose, the dose below which adverse health effects are likely to occur, is unsuitable for a contaminant like lead with a ubiquitous environmental presence and no known threshold level. The model assumes a background level of lead of 200 ppm. Use of the model permits use of a huge database on lead. However the Agency for Toxic Substances and Disease Registry prefers use of arguably more appropriate primate studies. See Gilbert & Rice, *Low-Level Lifetime Lead Exposure Produces Behavioral Toxicity (Spatial Discrimination) in Adult Monkeys*, TOXICOLOGY & APPLIED PHARMACOLOGY 91, 99, 484-90 (1987).

appropriate surrogates such as primate studies. In addition, significant data gaps exist regarding the relationships between low level exposures and effects.³⁹ Furthermore, death and disease rates have generally not been broken down by pertinent socioeconomic variables.⁴⁰ Yet despite the lack of important data, decision-making by environmental protection agencies depends heavily on existing scientific information.⁴¹

D. The Impact of Statutory Risk Management Directives and Technological and Economic Feasibility

Although environmental statutes do not generally set forth risk assessment methodologies, they do set forth specific and different risk management directives that are, at best, inconsistent and, at worst, ethnically biased.⁴² Inconsistent statutory standards and directives frustrate the assessment of the effectiveness of current laws in achieving their stated aims. Moreover, regulators develop institutional biases in favor of the programs they administer and the statutory mandates on risks that apply to them, biases that perpetuate fragmented and uncoordinated environmental health protection initiatives.⁴³

Environmental protection and management of environmental health risks are also defined by technology-based environmental standards⁴⁴ and technological feasibility. Technological feasibility

39. Cynthia H. Harris & Robert C. Williams, *Research Directions*, EPA J., Mar./Apr. 1992, at 40, 40.

40. Ken Sexton, *What's Known, What's Not Known: Cause for Immediate Concern*, EPA J., Mar./Apr. 1992, at 38, 38.

41. 2 ENVIRONMENTAL EQUITY, *supra* note 4 at 35-36; Patton, *supra* note 37, at 14. Due to "state of the art limitations on risk methods, resource limitations and statutory timetables for regulatory decisions" EPA is often required to complete risk assessments in the face of data gaps and other scientific uncertainties. *Id.* at 14.

42. Patton, *supra* note 37, at 13. The "Delaney Clause" of the Food, Drug and Cosmetic Act has a "zero risk" standard which prohibits the use of carcinogens. *Id.* The Federal Insecticide, Fungicide and Rodenticide Act, however, which regulates pesticides, prohibits unreasonable risks to man and the environment taking into account the economic, social, and environmental costs and benefits of the use of any pesticide. See Bullard & Wright, *supra* note 29, at 825. Minorities comprise almost all of the migrant and seasonal farm workforce exposed to pesticides with more than 80% Latinos, as well as Haitians, West Indians, Southeast Asians and Native Americans. Bullard & Wright, *supra* note 29, at 825-27. Women constitute one third of the hired farm labor force. 24 AMER. J. OF INDUS. MED. 753, 753-66 (1993). It is immediately apparent that the protection provided to the woman who purchases lipstick is far greater than that provided to the minority woman or individual who harvests your food.

43. Hornstein, *supra* note 18, at 594-95.

44. *Id.*

drives many pollution control initiatives. Under the Safe Drinking Water Act,⁴⁵ maximum containment levels must use the best available technology, taking cost into consideration. The Resource Conservation and Recovery Act⁴⁶ is also steeped in technological feasibility, and under the Clean Water Act,⁴⁷ the different technology-based standards include "best conventional technology" and "best available technology economically achievable."⁴⁸

Technology also plays a prominent role in the Occupational Health and Safety Administration. Eula Bingham, former head of the Occupational Health and Safety Administration, recently commented that "[i]n the occupational health arena, the key word is feasibility. We know we set standards which allow disease. The standards are based upon feasibility—technical and economic"⁴⁹

Regulatory agencies do not meaningfully address environmental health risks unless economically achievable, technological "fixes" are available, or existing scientific knowledge offers no practical solutions. Furthermore, the agencies fail to address many risks because scientific evaluation of their hazards "lags far behind the development of new products."⁵⁰ Technological advancements that are the source of most pollution are also, sometimes unfortunately, the basis for setting standards for environmental health protection and policy-making.⁵¹

E. Political Considerations

Political considerations commonly influence environmental regulatory decision-making and health protection agendas.⁵² Regulators quickly respond to inquiries about local environmental problems from legislators and elected officials. Resource reprioritization is effortlessly accomplished once a "congressional" comes in. Letters from individuals or disproportionately impacted com-

45. 42 U.S.C. §§ 300f to 300j-26 (1988).

46. *Id.* §§ 6901-6992k.

47. 33 U.S.C. §§ 1251-1287 (1988).

48. *Id.*

49. Betty Mushak, *Setting Environmental Agendas: The Search For Common Ground*, 101 ENVTL. HEALTH PERSP. 26, 27 (1993).

50. Perfecto & Velasquez, *supra* note 12, at 13.

51. See Hornstein, *supra* note 18, at 628 ("The relationship between technological innovation and governmental decisionmaking is hardly a secret. There is, indeed, a robust debate (one might say post-mortem) on the inability of many environmental statutes to achieve their ambitious technology-forcing goals.")

52. *Id.*

munities often do not receive such prompt responses.⁵³ Attention to the "squeaky wheel", the communities or individuals who complain to the appropriate parties, has resulted in disparate remedies and unequal allocations of resources between not necessarily poor and wealthy communities, but between minority and white communities, even where the human health risks are equivalent.⁵⁴ Selection among regulatory alternatives is, thus, highly susceptible to political pressure, regardless of risk or cost. As a result, decisions that are presented as rational, equitable, and scientifically based are often tainted by political biases.

F. Equitable Management Responsibilities

Equitable management of environmental protection programs is a further responsibility of environmental protection agencies. EPA sets forth two goals for itself as a means of achieving that aim: "[a]ssuring that the protection of public health and the environment is available to all segments of the population; and implementing environmental statutes in a manner that equitably confers benefits and risk reductions on all segments of the population."⁵⁵ In at least one case, federal regulation mandates equitable management of environmental protection programs.⁵⁶ Regardless of whether equitable management of environmental programs is specifically addressed by federal regulation, the environmental regulatory agencies are obligated under Title VI of the Civil Rights Act of 1964⁵⁷ to ensure that all federally assisted programs or activities that affect, or have the potential to affect, human health or the environment do not subject communities or individuals to discrimination because of their race, color, national origin, or gender. Environmental agencies also have a duty to include in their decision-making processes under the National Environmental Policy Act an analysis of social and economic impacts and reasonably foreseeable

53. 2 ENVIRONMENTAL EQUITY, *supra* note 4, at 89.

54. Marianne Lavelle & Marcia Coyle, *A Special Report; Unequal Protection: The Racial Divide in Environmental Law*, NAT'L L.J., Sept. 21, 1992, at S1, S6 (noting that EPA chooses containment over permanent treatment for minority sites 7% more frequently and chooses permanent treatment for white sites 22% more often).

55. 1 ENVIRONMENTAL EQUITY, *supra* note 4, at 9.

56. 40 C.F.R. § 7 (1993) ("Nondiscrimination in Programs Receiving Federal Assistance From the Environmental Agency", implementing Title VI of the Civil Rights Act as amended).

57. 42 U.S.C. § 2000d (1988).

human health impacts affecting the quality of the human environment.⁵⁸

G. Data Gaps

Nevertheless, nondiscriminatory management of environmental protection programs may be a difficult task for a variety of reasons. To ascertain whether different communities or groups are receiving the benefits of equitable, nondiscriminatory management of a particular environmental statute, one would need to know the specific demographics of that community or group. Unfortunately, such information has not generally been available because regulatory agencies generally have not collected demographic information.⁵⁹ Moreover, the United States does not categorize death and disease rates by important socioeconomic variables;⁶⁰ the United States is the only western country with a high standard of living that does not collect such data. Consequently, it is difficult in this country to discover whether inadequate management or enforcement of a particular environmental statute caused disease or death.

Finally, the EPA has observed that disproportionate numbers of blacks live near commercial hazardous waste treatment facilities or abandoned hazardous waste sites.⁶¹ It is also known that most minorities live in urban areas.⁶² Most of the sites, however, on the National Priorities List of the 1200 or so worst hazardous waste sites are not in urban areas,⁶³ resulting in a disparity in public and private spending for remediation of hazardous waste sites in favor of suburban and rural areas. Moreover, legal enforcement personnel or staff usually know virtually nothing about the ethnicity or demographics⁶⁴ of the sites for which they are responsible for assuring equitable implementation of environmental laws. Govern-

58. 40 C.F.R. § 1508.8(b) (1993).

59. 2 ENVIRONMENTAL EQUITY, *supra* note 4, at 36 (noting that “[i]n many cases, the Agency is unable to characterize the possible risk to a target population in terms of vital demographic factors”).

60. 1 ENVIRONMENTAL EQUITY, *supra* note 4, at 11; Sexton, *supra* note 40, at 38.

61. *See generally* U.S. GEN. ACCOUNTING OFFICE, SITING OF HAZARDOUS WASTE LANDFILLS AND THEIR CORRELATION WITH RACIAL AND ECONOMIC STATUS OF SURROUNDING COMMUNITIES (June 1983); UNITED CHURCH OF CHRIST, TOXIC WASTES AND RACE IN THE UNITED STATES 9-10 (1987).

62. 2 ENVIRONMENTAL EQUITY, *supra* note 4, at 7 (Table 4). According to the EPA, 86.1% of African Americans and 91.2% of Latinos live in urban areas.

63. Lavelle & Coyle, *supra* note 54, at S6. The National Law Journal study pointed out that according to EPA’s own data, only 18.4% of Superfund Sites are in urban areas while more than 39.6% are in the suburbs and 42% are in rural areas.

64. 2 ENVIRONMENTAL EQUITY, *supra* note 4, at 36.

ment personnel opine that such information is irrelevant to "colorblind" enforcement of the law.⁶⁵

The previously discussed factors, considerations, statutory directives, and political realities, which temper and shape the public health protection provided by environmental regulatory agencies, demonstrate the difficulty of effectively carrying out that responsibility. Historically, "environmental programs at all levels of government have set universal standards for individual pollutants emitted by specific types of sources with the goal of protecting the environment and all people."⁶⁶ Everyone is not affected in the same way by pollution, however, and accordingly, the standards were sometimes extremely conservative, set to protect the most vulnerable groups such as asthmatics or pregnant women.⁶⁷ Nevertheless, at least in some cases, it is still clear that existing standards may not protect the most vulnerable groups.⁶⁸ The findings of a Harvard University study of urban air pollution, for example, suggest that urban air pollution standards may not be sufficiently stringent.⁶⁹ Furthermore, when given the opportunity to extend greater protection to subgroups disproportionately susceptible to pollution, the Agency has not done so. In the case of ozone, the American Lung Association is suing EPA to force the Agency to revise its standard. While recognizing that minorities are disproportionately asthmatic and affected by ozone, the EPA nonetheless declined to revise its current ozone standard.⁷⁰

III. The Importance of Considering Variation in Susceptibility to Insult When Setting Environmental Policy

A. Variation in Vulnerability to Environmental Insult

Environmental regulatory agencies have failed to give variation in vulnerability to environmental insult the attention it deserves. Most environmental agencies recognize that some groups are much more likely to suffer adverse health effects and poor health out-

65. Many members of EPA regional staff believe that the Agency's activities are equitable because they focus on the environment, not particular groups. The belief that a focus on national standards and resources protects all communities equally is, at least partially, the reason that instances of disproportionate allocations of pollution continue unchecked. *Id.* at 53.

66. *Id.* at 1.

67. *Id.*

68. See Douglas Dockery et al., *An Association Between Air Pollution and Mortality in Six U.S. Cities*, 239 *NEW ENG. J. MED.* 1733 (Dec. 1993).

69. *Id.*

70. *Id.*

comes from exposure to pollutants; all people do not respond equally to environmental insult. There are significant differences in the physical composition of various groups, which are manifested in measurable ways, such as total lung capacity. African Americans, for example, generally have smaller lungs than whites for a given height, and in acknowledgement of that difference, the Occupational Safety and Health Act (OSHA) cotton dust standard suggests that the "average healthy black male has a vital capacity approximately 85% of the average healthy white male."⁷¹ Nevertheless, most environmental agencies have not responded by development of a consistent and rational approach to protecting vulnerable populations. In a myriad of ways the existing regulatory framework for human health protection ignores currently existing scientific information.

According to an EPA report, several vulnerable population groups sensitive to the health effects of air pollution are disproportionately comprised of poor or minority group members.⁷² These groups include asthmatics, anemics, women at risk for delivering low birth weight fetuses, and individuals with various cardiovascular diseases.⁷³ African Americans suffer disproportionately from asthma, cardiovascular disease, and anemia, and are more likely to give birth to low birth weight babies.⁷⁴ Furthermore, asthmatics are particularly sensitive to carbon monoxide, sulfur oxides, particulate matter, ozone, and nitrogen oxides; individuals suffering from cardiovascular disease and anemia are more sensitive to the effects of carbon monoxide and particulate matter.⁷⁵

Although the EPA report goes on to state that to redress those differences "the Agency could consider any number of steps from enhanced education for the affected populations to regulatory action,"⁷⁶ the Agency has failed to consider these steps.⁷⁷ One of the

71. *Problems Faced By Minority Workers*, in OCCUPATIONAL HEALTH 389-402 (David Wegman & Barry Levy eds., 1981).

72. 2 ENVIRONMENTAL EQUITY, *supra* note 4, at 21.

73. *Id.*

74. *Id.*; Erin Marcus, *Asthma's Grip: Millions Gasp for Breath as Serious Attacks Sour and Deaths Nearly Double*, WASH. POST, Aug. 4, 1992, at A10 (noting that "blacks suffer from asthma more than whites and are more likely to die from the condition's complications. . . . [A]sthma kills three out of every 100,000 blacks and nearly two out of every 100,000 whites").

75. 2 ENVIRONMENTAL EQUITY, *supra* note 4, at 21.

76. *Id.*

77. EPA declined to revise its current ozone standard on March 1, 1993 despite being sued by the American Lung Association. 58 Fed. Reg. 13,008 (1993); U.S. ENVTL. PROTECTION AGENCY, INSIDE EPA'S CLEAN AIR REPORT T-1 (Aug. 26, 1993).

chief barriers to effective protection of sensitive subpopulations is the lack of information.⁷⁸ The EPA acknowledges that because the risk of exposure varies among members of vulnerable populations, it is necessary to divide those populations into subgroups according to age, gender, race, and ethnicity to protect them adequately.⁷⁹ While some risk management decisions focus on particular populations, many decisions supporting national regulatory initiatives focus on the average person who would have the average susceptibility to pollutant exposure.⁸⁰ This focus is apparently based upon the belief that the exposed population is of uniform susceptibility and/or that vulnerable populations are small. Risk assessment models are often based upon the same erroneous assumption. For example, the "widely accepted linearized multistage model, considered to be one of the most conservative of the biologically plausible risk assessment models, works on the assumption that the exposed population is of uniform susceptibility and that interactions do not occur between chemical exposures and other risk factors."⁸¹ By focusing on the "average" person, the Agency consciously sacrifices those known to be more susceptible, including women of childbearing years, pregnant women, the elderly, the critically ill, children, fetuses, and persons with respiratory diseases.⁸² According to the Agency, this is simply a result of the lack of data, "rather than a reluctance to deal with the issues raised by incorporation of such data in the analysis."⁸³

B. Susceptibility of the Average Person to Environmental Insult

Even the "average person" with "average" susceptibility to environmental insult is more vulnerable at one time or another during the day, during their lives, and during their different daily activities. Vulnerability is affected by various factors including age, differences in circadian rhythms, general health status, gender, diet, and genetic differences.⁸⁴ The misconception that conservative standards designed to protect asthmatics or pregnant women pro-

78. 2 ENVIRONMENTAL EQUITY, *supra* note 4, at 35.

79. *Id.*

80. *Id.* at 36; Federica Perera & Paolo Boffetta, *Perspectives on Comparing Risks of Environmental Carcinogens*, 80 J. NAT'L CANCER INST. 1282, 1284-85 (1988).

81. Perera & Boffetta, *supra* note 80, at 1285.

82. See *supra* notes 71-75 and accompanying text.

83. 2 ENVIRONMENTAL EQUITY, *supra* note 4, at 36.

84. EDWARD J. CALABRESE, *POLLUTANTS AND HIGH RISK GROUPS: THE BIOLOGICAL BASIS OF INCREASED HUMAN SUSCEPTIBILITY TO ENVIRONMENTAL AND OCCUPATIONAL POLLUTANTS* 26, 34-65, 93-112 (1978).

vide everyone with adequate protection is based upon the assumption that vulnerable populations comprise a very small percentage of the general population. This assumption is simply not true.⁸⁵ Experts point out that to ignore a relatively small segment of the population in the development of health standards is to ignore everyone at a certain time during their lives.⁸⁶ Finally, the "average" person selected to serve as the subject of an experiment is generally young, but not too young, healthy, disease-free, and not subject to any genetic conditions or nutritional deficiencies that affect risk.⁸⁷ The "average" person is thus not reflective of the general population, which includes many more individuals who do not conform to those assumptions.

While everyone varies in susceptibility to environmental insult, some subgroups are generally more susceptible. In these subgroups, conditions that would make the "average" person susceptible are compounded. For instance, an elderly person might have a respiratory illness and live in an area with excessive levels of pollutants, such as carbon monoxide and particulate matter, to which the elderly are particularly sensitive.⁸⁸ Current standards fail to protect these types of groups.

Regulatory agencies have failed to identify the most vulnerable groups.⁸⁹ In particular, women of childbearing years are not regularly included in groups of vulnerable populations. Characterizing and clearly identifying this group of individuals, for whom protection is not economically or technologically feasible or for whom adequate data is not available for incorporation into risk analysis, is useful even if only to identify a more equitable basis for risk-based reprioritization or for enhanced education for the affected populations.

C. Impact on Minorities and Women

Vulnerable populations are disproportionately young, minority, or female and are often some combination of the three categories. For example, environmental exposures may aggravate certain diseases more common in women, such as osteoporosis, and many environmental toxicants are lipophilic, resulting in accumulations in

85. *Id.* at 186-93 (Table 26).

86. *Id.* at 185-86.

87. *Id.*

88. 2 ENVIRONMENTAL EQUITY, *supra* note 4, at 34.

89. Identification and quantification of the numbers of individuals in the population at high risk is still in its rudimentary stages. CALABRESE, *supra* note 84, at 1.

fatty tissue.⁹⁰ Some of these “fat-loving” chemicals include PCBs, dioxins, DDT, and organochloride pesticides.⁹¹ PCBs in quantities sufficient to cause neurological effects are believed to be so widely dispersed that five percent of the children in the United States have been exposed.⁹² Because women have a greater percentage of body fat than men, they tend to accumulate more of these damaging compounds.⁹³ Furthermore, the death rate from breast cancer, has increased dramatically, and “abundant epidemiological and experimental data support the probable role of environmental factors and chemical carcinogens in the etiology of breast cancer.”⁹⁴

The government has recognized that minority and low income populations are subject to disproportionate exposures from air pollution and hazardous waste disposal activities.⁹⁵ According to the EPA, one third of all National Priorities List (NPL) sites⁹⁶ have a sensitive environment within three miles. The Agency for Toxic Substances and Disease Registry states that almost half of the 4.1 million people who lived within one mile of 725 Superfund Sites were members of various vulnerable subgroups.⁹⁷

The government has identified two groups that generally bear higher than average environmental risk—individuals who experience the highest exposures because of where they live, work, or conduct activity, and individuals who are biologically susceptible to the adverse health effects of pollution.⁹⁸ This second group of high risk individuals include the developing fetus, young children, pregnant women, individuals with chronic diseases, individuals with poor immune systems, and the elderly.⁹⁹ Many minorities fall into

90. See generally Theo Colborn et al., *Developmental Effects of Endocrine-Disrupting Chemicals in Wildlife and Humans*, 101 ENVTL. HEALTH PERSP. 378 (1993).

91. *Id.*

92. *Id.* at 381.

93. *Id.*

94. National Inst. of Env'tl. Health Sciences, *NIEHS News*, 101 ENVTL. HEALTH PERSP. 110, 110-11 (1993).

95. U.S. ENVTL. PROTECTION AGENCY, NPL CHARACTERIZATION PROJECT: NATIONAL RESULTS 1991B (Nov. 1991) [hereinafter NPL CHARACTERIZATION PROJECT]; NATIONAL RESEARCH COUNCIL, ENVIRONMENTAL EPIDEMIOLOGY: PUBLIC HEALTH AND HAZARDOUS WASTES 68 (1991).

96. See *supra* note 8.

97. NPL CHARACTERIZATION PROJECT, *supra* note 95: National Results. 1991b (November 1991); NATIONAL RESEARCH COUNCIL, *supra* note 95, at 68.

98. NPL CHARACTERIZATION PROJECT, *supra* note 95, at 1991B; NATIONAL RESEARCH COUNCIL, *supra* note 95, at 68.

99. *Id.*

both of these categories and are at the highest risk.¹⁰⁰ Minorities, especially blacks and hispanics, are subject to greater occupational exposures because they are overrepresented in the most hazardous fields.¹⁰¹ They are usually subject to multiple pollutant exposures because they reside overwhelmingly in urban areas that are both in nonattainment under the Clean Air Act¹⁰² and have a higher prevalence of older housing stocks likely to contain lead based paint. Their municipal water supplies either have not been tested or have lead levels that violate the Safe Drinking Water Act.¹⁰³ These multiple residential, occupational, and geographic exposures tend to lower damage thresholds for individual pollutants.¹⁰⁴ Predisposing factors for biological susceptibility, such as pre-existing diseases, occur more frequently among minorities.¹⁰⁵ Among the preexisting diseases prevalent among minorities are diabetes, chronic liver diseases, cardiovascular diseases, chronic respiratory diseases like asthma, and HIV.¹⁰⁶ In addition, social and demographic factors lead to higher proportions of minorities in susceptible age groups; minorities are generally younger than non-minorities.¹⁰⁷ Minorities also have disproportionately more children and women of childbearing years living in their communities.¹⁰⁸ Consequently, a higher proportion of minority women are pregnant at any given time.

Pregnant women, fetuses, neonates, infants, and children are all more susceptible to environmental insult at equivalent exposures.¹⁰⁹ For example, the developing fetus may be at a much greater risk for adverse health effects from maternal inhalation of methanol.¹¹⁰ Calabrese, in his ground breaking work, *Pollutants and High Risk Groups*, describes five categories of biological factors that predispose individuals to the toxic effects of environmen-

100. *Id.* at 13.

101. George Friedman-Jimenez, *Occupational Disease Among Minority Workers*, 37 AAOHN J. 64, 64-65 (1989).

102. 42 U.S.C. §§ 7401-7642.

103. 42 U.S.C. §§ 300f to 300j-26.

104. Richard Rios et al., *Susceptibility to Environmental Pollutants Among Minorities*, 9 TOXICOLOGY AND INDUS. HEALTH 797, 804-12 (1993).

105. *Id.* at 798-803.

106. *Id.* at 808-10.

107. U.S. DEP'T OF HEALTH AND HUMAN SERV., HEALTH STATUS OF MINORITIES AND LOW INCOME GROUPS (3d ed. 1991) [hereinafter HEALTH STATUS OF MINORITIES]; U.S. DEP'T OF HEALTH AND HUMAN SERV., TRENDS IN INDIAN HEALTH (1991).

108. HEALTH STATUS OF MINORITIES, *supra* note 107.

109. CALABRESE, *supra* note 84, at 4-26.

110. *Id.*

tal and occupational pollutants: development, genetics, dietary deficiencies, disease, and behavioral factors.¹¹¹ While these categories are important for both sexes, their increased significance for women results from what we know to be the significance of female exposure to contaminants before pregnancy.¹¹²

Notwithstanding pregnancy, women of childbearing years are exposed to greater risk. One recent study found that women of childbearing years were more susceptible to ozone exposure because of fluctuations in blood progesterone levels caused by the female menstrual cycle.¹¹³ Ozone exposure can cause airway inflammation, respiratory discomfort, and pulmonary function impairment.¹¹⁴

The government and scientists agree that sensitive subpopulations are at greatest risk, and minorities,¹¹⁵ women, and children are disproportionately represented in this group.¹¹⁶ Commenting on the danger to sensitive subgroups from exposure to radar, for example, the EPA noted that although continual exposure to radar may not be harmful to healthy young men, "[t]his may not be true for the population at large. Sensitive subgroups, e.g., the young, elderly, ill or pregnant women may not be as adaptive and can have compromised [biological] systems."¹¹⁷ According to a two year study by the Natural Resources Defense Council, children are at the greatest risk from the government's failure to adequately regulate pesticides.¹¹⁸ *Breath in Danger II*, a report by the American Lung Association, estimated that over 150 million Americans live in areas of nonattainment under the Clean Air Act, 31 million of whom are children under 13 and more than 18 million of whom are over 65. In addition, more than a third of the nation's pregnant women and 60% of pre-adolescent children live in these high risk areas.¹¹⁹ A study by the National Academy of Sciences concluded that children might be highly sensitive to pesticides in food they

111. *Id.*

112. Many pollutants bioaccumulate long before a woman becomes pregnant and cross the placenta once she conceives. Colborn et al., *supra* note 90, at 380.

113. Susan D. Fox et al., *Enhanced Response to Ozone Exposure During Follicular Phase of the Menstrual Cycle*, 101 ENVTL. HEALTH PERSP. 242, 242-44 (1993).

114. *Id.*

115. *See supra* notes 94-106 and accompanying text.

116. Barbara Pettick & Barbara Shey, *Proposed Radar Endangers Health*, NEWS-DAY, Mar. 2, 1990, at 81; Al Meyerhoff, *Why Stomach This 'Necessary Evil'? Public's Cry Is for Pesticide Action, Not Foot-Dragging*, L.A. TIMES, May 15, 1989, at 5.

117. Pettick & Shey, *supra* note 116, at 81; Meyerhoff, *supra* note 116, at 5.

118. Pettick & Shey, *supra* note 116, at 81; Meyerhoff, *supra* note 116, at 5.

119. Pettick & Shey, *supra* note 116, at 81; Meyerhoff, *supra* note 116, at 5.

consume and that their intake of pesticides on raw agricultural commodities is sixty times higher than that consumed by adults.¹²⁰ Several other studies have found serious health effects, including deaths among children with respiratory problems, adults with asthma and the elderly with illnesses such as bronchitis and emphysema, to be strongly associated with exposure to particulate matter.¹²¹ The current standard allows an estimated 50,000 to 60,000 deaths a year and places sensitive subpopulations at an elevated risk.¹²² A study conducted by the National Academy of Sciences and Brookhaven National Laboratories that looked at the health risks associated with eating contaminated seafood found that those likely to be at elevated risk were “[p]opulations at special risk for metal toxicity (eg., pregnant women, the fetus, the elderly, and subsistence fishers with varying nutrition).”¹²³

D. Inadequate Responses By Regulators

The EPA and its scientists agree which groups face the greatest risk of death, injury, or disease as a result of environmental exposures and that ethnic minorities are disproportionately represented within sensitive subgroups.¹²⁴ The effectiveness of EPA's response, however, is open to debate. At least one way to address the disproportionate over-representation of women and ethnic minorities among sensitive subpopulations is to educate people of color on their greater risk and on ways to tailor their conduct accordingly. The government could also develop specific regulatory action to mandate consideration of vulnerable populations. Although the EPA has suggested these approaches, it has not implemented them in any comprehensive or consistent way.

Instead, the agency only considers relevant information in hodge-podge fashion when it is available.¹²⁵ According to the EPA Environmental Equity report, if the agency has information about the susceptibility of certain subgroups, it takes that information

120. NATIONAL INST. OF ENVTL. HEALTH SCIENCES, *Environews: Kids At Risk*, 101 ENVTL. HEALTH PERSP. 389, 389-90 (1993).

121. See, e.g., Bart Ostro, *The Association of Air Pollution and Mortality: Examining the Case for Inference*, 48 ARCHIVES ENVTL. HEALTH 336 (1993); Leendert van Bree, *Air Pollution: Alerting Endangered People*, WORLD HEALTH, Sept. 1993, at 16; Paul Cotton, 'Best Data Yet' Say Air Pollution Kills Below Levels Currently Considered Safe, 269 JAMA 3087 (1993).

122. *Id.*

123. *Human Health Risks Due To Consumption Of Chemically Contaminated Fishery Products*, 101 ENVTL HEALTH PERSP. 297 (Supp. 3) (Oct. 1993).

124. 2 ENVIRONMENTAL EQUITY, *supra* note 4, at 21.

125. *Id.* at 34-36.

into account and, if the available database provides insight into demographic factors, considers those factors.¹²⁶ However, certain risk assessments “supporting national regulatory initiatives focus on the average person who might be expected to have an average susceptibility to exposure to toxic contaminants.”¹²⁷ Risk managers then make their decisions without any “mechanisms, such as published guidelines or other institutional elements” that require consideration of effects on sensitive subgroups.¹²⁸ When information is unavailable, regulators may exercise unguided discretion, theorize that sensitive populations may or may not be affected, and set cleanup or action levels accordingly. Decision-making by risk managers generally involves only rough estimates and thus offers no assurance of adequate protection for vulnerable subgroups.

E. Value of Risk Assessment in Protecting Vulnerable Groups

Although regulators use risk assessment as a tool to protect sensitive subgroups, its value in this area is questionable. Preliminarily, it should be noted that risk assessments generally have focused on cancer risks but not risks to vulnerable populations.¹²⁹ In addition, risk assessments generally do not look at the exposed populations even though human data from well designed epidemiologic studies would contain the most relevant information, because “human data are not often available.”¹³⁰ Instead, risk assessments extrapolate the risk to exposed populations by examining the risk of potentially hazardous substances to animals through mathematical models or short term tests that look at molecular structure, or epidemiological studies that look at accidental human exposures.¹³¹ According to the EPA, “[g]iven this limited study population, the extrapolated hazards to the general population may not portray the range of consequences to children, the elderly, the sick and in-

126. *Id.*

127. *Id.* at 36.

128. *Id.*

129. U.S. ENVTL. PROTECTION AGENCY, *Updated Developmental Toxicity Risk Guidance to Focus on Exposure*, INSIDE EPA WEEKLY REP., Nov. 15, 1991, at 12. A “stinging” General Accounting Office report, for example, suggested that EPA had overlooked fetal risks and risks to young children in focusing almost exclusively on cancer risks. *Id.*

130. Proposed Guidelines for Assessing Female Reproductive Risk, 53 Fed. Reg. 24,834, at 24,835 (1988).

131. 1 ENVIRONMENTAL EQUITY, *supra* note 4, at 18. The majority of epidemiologic studies which are in use involved white males working in industry. The carcinogenic potency for group A carcinogens and the direct evidence of non-cancer health effects is derived by the EPA from these studies. *Id.*

firmed, females, racial/ethnic groups, or low income populations."¹³²

Because risk assessment looks at surrogates for humans, such as animals, rather than the true population about which it seeks to draw conclusions, the process includes many inherent flaws. Risk assessment assumes that animals are appropriate substitutes for the human population, but obviously, this is not true in every case.¹³³ A number of observers have challenged the relevance of animal data for particular types of carcinogens based upon several conditions. Different species have purported differences in metabolism, target tissue response, or inherent sensitivity differences.¹³⁴ Also, "because of cost and feasibility constraints and the difficulty in identifying an appropriate study population, the vast majority of animal carcinogens, both naturally occurring and man-made, have neither been the subject of epidemiological investigation nor are they likely to be."¹³⁵ For example, a ban on cinnamyl anthranilate, a food flavoring agent, was lifted because the animal-to-human extrapolation was unreliable.¹³⁶ Furthermore, scientists have challenged the practice of giving animals the Maximum Tolerated Dose and then estimating human risk at exposures thousands of times lower than the MTD as inadequate to predict excess numbers of cancers.¹³⁷

Risk assessment also assumes that white males are appropriate surrogates for minorities, women, and children, a similarly inaccurate hypothesis. The body weight used in the exposure assessment should reflect the average weight of the exposed population,¹³⁸ yet most women and children weigh less than the average male. Consequently, "a child's exposure to pollutants in drinking water is proportionally greater than the exposure of the adult. . . . Children may also consume more of a contaminated food than adults."¹³⁹

132. 2 ENVIRONMENTAL EQUITY, *supra* note 4, at 33.

133. NATIONAL INST. OF ENVTL. HEALTH SCIENCES, *Risk Assessment: The Perspective and Experience of U. S. Environmentalists*, 101 ENVTL. HEALTH PERSP. 100, 100-04 (1993); Mary Weideman, *Toxicity Tests in Animals: Historical Perspectives and New Opportunities*, 101 ENVTL. HEALTH PERSP. 222, 222-25 (1993); Perera & Boffetta, *supra* note 80, at 1284-87.

134. National Inst. for Env'tl. Health Sciences, *Toxicity Tests in Animals: Extrapolating to Human Risks*, 101 ENVTL. HEALTH PERSP. 396, 396 (1993).

135. Perera & Boffetta, *supra* note 80, at 1284.

136. National Inst. for Env'tl. Health Sciences, *supra* note 134, at 397.

137. *Id.*

138. Perera & Boffetta, *supra* note 80, at 1287.

139. *Id.* ("[C]hildren ingest an estimated 1 L[iter] of water per 10 kg of body weight compared with 2 L[iters] or more per 70 kg of body weight for the adult.")

Finally, mathematical models for hazard assessment do not allow for such factors as different dose-response levels between children, adults and the elderly and different physiological factors between populations. At the risk management stage, regulators incorporate information on hazard, exposure, and risk characterization. However, they have no guidance to promote consideration of equitable factors or to factor in issues pertaining to sensitive subgroups.¹⁴⁰ For instance, to identify unacceptable human health risks the Superfund program uses the Hazardous Ranking System (HRS), a mathematical model that assesses relative risks of releases of hazardous waste from a site.¹⁴¹ Results of risk assessment from the HRS model are not always equivalent to those of a toxicological risk assessment.¹⁴² Where use of different models yields different conclusions about risk, the EPA has no internal policy stressing a preference for the most conservative result when the exposed population is disproportionately comprised of sensitive subgroups and no "institutional elements which guide the decision logic of addressing equity".¹⁴³

Risk assessment and management still generally focus on evaluating the effects of single pollutants although cumulative exposures are much more common and harmful.¹⁴⁴ An article on environmental carcinogens in the Journal of the National Cancer Institute noted that "a number of epidemiological studies have demonstrated synergism between chemical exposures and host factors, such as cigarette smoking and air pollutants in the workplace and urban air."¹⁴⁵ While some EPA and Public Health Service studies are examining cumulative and synergistic risks that can be greatly magnified, business has strongly resisted any regulatory solutions that include tighter regulations without significant "additional research."¹⁴⁶

Thus, risk assessments have not been tremendously effective in protecting vulnerable populations, primarily because of the mis-

140. 2 ENVIRONMENTAL EQUITY, *supra* note 4, at 36.

141. 40 C.F.R. § 300 (1993).

142. Tafti Dehghani & Ginny Sells, *Hazardous Ranking System and Toxicological Risk Assessment Models Yield Different Results*, HAZMAT WORLD, Sept. 1993, at 62-66.

143. 2 ENVIRONMENTAL EQUITY, *supra* note 4, at 36.

144. U.S. ENVTL. PROTECTION AGENCY, *EPA Efforts to Cut Minority Pollution Risks Could Push Tighter Regs, Staff Say*, INSIDE EPA WEEKLY REP., Nov. 8, 1991, at 12; Perera & Boffetta, *supra* note 80, at 1284.

145. Perera & Boffetta, *supra* note 80, at 1284.

146. Peter Hong, *Do Two Pollutants Make You Sicker Than One?*, BUS. WK., Sept. 28, 1992, at 77-78.

taken assumption that vulnerable subpopulations make up only a small fraction of the general population.¹⁴⁷ In addition, most risk assessments, and even descriptions of vulnerable populations, leave out one of the largest subgroups—women of childbearing years—a group in which minorities are overrepresented.¹⁴⁸

The failure to adequately protect women of childbearing years results in a failure to adequately protect subsequent generations. For example, blood levels that are considered safe for the mother, seven to nine micrograms of lead per deciliter, are high enough to cause learning deficits in a fetus.¹⁴⁹ Additionally, exposure levels considered safe even for children may not be safe for a fetus.¹⁵⁰ Scientists have identified neurobehavioral deficits related to lead exposures that were well below the “corrective action level” proposed by the Centers for Disease Control.¹⁵¹

Toxic exposures are generally believed to affect fertility and cause spontaneous abortions and birth defects.¹⁵² However, adequate concrete information about adverse reproductive health effects among humans is not currently available. For example, male infertility may seem relatively easy to study because the entire physiologic pathway converges into a single quantifiable body fluid.¹⁵³ Nevertheless, in practice, conclusions may be difficult to reach because regulators may resist testing and specimens require immediate analysis.¹⁵⁴ Adverse reproductive health effects in women, both before and after conception, are harder to study.¹⁵⁵ Consequently, even the EPA’s biomarker research agenda focuses initially on males because of the relative ease of obtaining samples from men of reproductive age.¹⁵⁶ The EPA’s gender bias is obvious; EPA is planning twice as many studies on male reproductive

147. See *supra* notes 85-123 and accompanying text.

148. Rios et al., *supra* note 104, at 811.

149. David Bellinger, Ph.D. et al., *Longitudinal Analyses of Prenatal and Postnatal Lead Exposure and Early Cognitive Development*, NEW ENG. J. MED. 1037-43 (Apr. 23, 1987).

150. Kim N. Dietrich, Ph.D. et al., *Low-Level Fetal Lead Exposure Effect on Neurobehavioral Development in Early Infancy*, PEDIATRICS 721-30 (1987).

151. *Id.*

152. Mark R. Cullen et al., *Occupational Medicine*, NEW ENG. J. MED. 675-83 (1990).

153. *Id.*

154. *Id.*

155. *Id.*

156. NATIONAL INST. OF ENVTL. HEALTH SCIENCES, *EPA Priorities For Biologic Markers Research in Environmental Health*, 98 ENVTL. HEALTH PERSP. 235, 240 (1992).

risk as on female reproductive risk and developmental toxicity¹⁵⁷ although women have been traditionally underrepresented or banned from clinical research on the basis of gender.¹⁵⁸

According to an unpublished study by the National Institute of Environmental Health Sciences (NIEHS), women are more likely to develop or experience serious health effects as a result of environmental exposures.¹⁵⁹ The reasons for greater vulnerability include women's higher percentage of body fat,¹⁶⁰ use of oral contraceptives, and hormonal variations caused by the female menstrual cycle.¹⁶¹ Despite the greater susceptibility of women of child bearing years to environmental insult, concerns about the unacceptable risks of testing on them have ironically resulted in their exclusion from studies of cardiovascular disease, cancer, AIDS, and other diseases, studies that have been conducted only on men or post-menopausal women.¹⁶² In addition, pharmaceutical companies have been able to market drugs with little or no information about their reproductive impact and to conduct large-scale clinical trials without female subjects.¹⁶³ A National Institute of Health (NIH) memorandum concludes that "[w]ithout adequate representation of women in study populations, we cannot truly know whether we are most effectively diagnosing, treating and preventing illness in our women patients."¹⁶⁴ Similarly, without including women of childbearing years in sensitive subpopulations and demographic characterizations of exposed communities, there is no way to ensure they are receiving the benefits of the equitable management of environmental protection programs that the law requires.

A related issue arises because women of childbearing years may initially be unaware of their pregnancy. Thus, during the period between conception and the mother's knowledge of the pregnancy, the fetus bears the increased risk due to the failure to adequately protect the mother. For example, suppose a regulatory agency is cleaning up a hazardous waste site contaminated with lead. A typical health advisory from the Agency for Toxic Substances and Dis-

157. *Id.*

158. NATIONAL INST. OF ENVTL. HEALTH SCIENCES, *What's Good for the Gander May Not Be Good for the Goose*, 101 ENVTL. HEALTH PERSP. 121, 121-22 (1993) [hereinafter *What's Good for the Gander*].

159. *Id.*

160. *See supra* note 93 and accompanying text.

161. *What's Good for the Gander*, *supra* note 158, at 121-22.

162. *Id.*

163. *Id.*

164. *Id.*

ease Registry will warn of the risk to children under six, but not to women, some of whom may be pregnant, although it is undisputed that lead crosses the placenta and poses a risk to the fetus.¹⁶⁵ If women of childbearing years were also warned of the danger posed by the site, they might take precautions to prevent pregnancy during cleanup.

Another issue of particular concern for women of childbearing years, and particularly minority women, is the potential for passing on pollutants to their young by means of breast feeding. Again the incidence of bioaccumulation of pesticides and other chemicals in breast tissues is high and well known. According to the EPA, pregnant women may bioaccumulate lipophilic pollutants in their breast milk and transfer exposures to the nursing infant that are ten times higher than the mother's exposure.¹⁶⁶ Minority women of child bearing years who are employed in high risk industries such as agriculture are most likely to have bioaccumulation of pesticides in their breast milk. The government acknowledges that agricultural workers receive the least protection from environmental regulatory agencies,¹⁶⁷ as farm workers are intentionally excluded from the Occupational Safety and Health Act, the Fair Labor Standards Act, and the National Labor Relations Act.¹⁶⁸ Yet these most vulnerable women are destined to receive even less protection as governmental resources are reallocated to address risks facing a greater aggregate number of people.¹⁶⁹

It is beyond dispute that some groups receive better public health protection from environmental regulatory agencies than others. It also appears that the most vulnerable groups are those that are traditionally disenfranchised: minorities, women, and children. Although there are a number of barriers to providing adequate protection to these groups, they are not insurmountable.

165. Breslin, *supra* note 9, at 486.

166. *Feds Warn of New Dioxin Dangers*, N.Y. DAILY NEWS, June 23, 1993, at 14; U.S. ENVTL. PROTECTION AGENCY, GUIDELINES FOR EXPOSURE ASSESSMENT (1991).

167. Perfecto & Velasquez, *supra* note 12, at 13-14. Approximately 90% percent of all farm workers in the U.S. are minorities. *Id.* at 13.

168. *Id.* at 14.

169. *See, e.g.*, REDUCING RISK, *supra* note 2, at 16 (EPA should target the most cost effective risk reduction options).

IV. Feasibility of Protecting Vulnerable Populations

A. Protection is Economically Feasible

The misconception persists that strong environmental regulation will negatively affect economic growth. In actuality, a recent study performed by an MIT economist established that the states with the strongest environmental regulation have the strongest overall economies.¹⁷⁰ There is also a misconception that we cannot afford to set standards conservative enough to protect sensitive subgroups. As a practical matter, however, we cannot afford the true costs of not protecting these vulnerable subgroups. These real costs include both the societal costs, such as the injuries to lead poisoned children or families that lose a wage earner to cancers, respiratory illnesses, or deaths, and all medical costs for treating environmentally triggered diseases and deaths.

B. Mechanisms Currently Available To Protect the Most Vulnerable

One approach that toxicologists suggest to protect the most vulnerable is surprisingly simple—stop or limit the toxic exposure. Analogizing the risk from hazardous waste sites to the risk from second-hand smoke, they argue that

[f]rom the perspective of prevention, society has decided to minimize the risks associated with smoking by encouraging smokers to quit and by limiting circumstances where they can smoke. Government has not found it necessary to conduct risk assessments and cost benefit analyses comparing various levels of exposures, to nonfiltered smoke, filtered smoke and different amounts of tar, for example, in order to conclude that smoking cessation is the most efficient method for ameliorating the effects of exposure to cigarette smoke. Similarly, persons exposed to hazardous waste should be protected from exposure.¹⁷¹

This type of approach assigns to public health agencies the responsibility of identifying the individuals exposed to contaminants of concern.¹⁷² Once the individuals at risk are identified, the role of regulatory agencies would be to eliminate the source of exposure

170. CITIZENS ENVIRONMENTAL COALITION, NEWSLETTER: TOXINS IN YOUR COMMUNITY, Winter 1994, at 20 (citing STEPHEN MEYER, ENVIRONMENTALISM AND ECONOMIC PROSPERITY: TESTING THE ENVIRONMENTAL IMPACT HYPOTHESIS).

171. Marvin S. Legator & Sabrina F. Strawn, *Public Health Policies Regarding Hazardous Waste Sites and Cigarette Smoking: An Argument by Analogy*, 101 ENVTL. HEALTH PERSP. 8, 11 (1993).

172. *Id.*

or relocate those exposed, even providing for residential moves, without further risk assessment.¹⁷³

Another similar alternative, which would eliminate the need for extensive and expensive studies and testing, is a technology-based approach or an outright ban. For example, until improper disposal of hazardous waste was made illegal, companies that could well afford to pay the true cost for appropriate disposal of hazardous waste declined to do so. With the advent of CERCLA, however, corporations changed their disposal practices almost overnight. An outright ban on toxic substances would acknowledge that there are some chemicals whose risks need not be quantified.¹⁷⁴ We know that they are dangerous, like the RCRA "California List" that Congress identified as too hazardous for land disposal. The European approach, which adopts a similar method for identifying risk, simply applies a safety factor to all toxicants, including non-carcinogens that might cause fetal damage.¹⁷⁵ The California Proposition 65 approach uses risk assessments to trigger disclosure provisions, and not to support regulatory decisions. The rationale behind disclosure is that manufacturers of the most hazardous substances would rather reformulate them than disclose what they are releasing into the environment.¹⁷⁶

The disclosure approach would eliminate expensive, lengthy, and sometimes inconclusive testing for adverse human health effects. It would also accord respect to the common sense notions of public health protection that provided the impetus for the passage of many of the federal environmental laws. The goal of these laws was not to study every conceivable substance in commercial use for every conceivable adverse health effect. Clearly the funding available for that task and the time it would involve would hamstring serious health protection initiatives although many individuals employed in the sciences would find lifetime employment. Rather the goal, and the charge to regulatory agencies, was to protect public health.

The word "protect" has the same meaning for the public at large as it does for us as individuals. When we individually protect our loved ones, we automatically apply an adequate margin of safety.

173. *Id.*

174. *Id.*

175. See, e.g., David Thomas, 1992 - *Redrawing the Map of Europe; A Distinct Change of Gear*, FINANCIAL TIMES, July 2, 1990, at vii.

176. Paul Jacobs, *China Makers Agree to Cut Lead Use, Warn Consumers*, L.A. TIMES, Jan. 16, 1993, at A1. This approach has had some success but that success is hard to measure.

We do not wait to see if the speeding truck is really going to hit our child before we shout a warning or remove the child from danger. Similarly, when the government is charged with the duty to protect public health, it recognizes in some cases that it ought to minimize exposures.¹⁷⁷ In those cases, a better use of resources, if any additional study was needed, would limit study to determining how that task can be expeditiously accomplished.

Vulnerable populations would be better served by comprehensive initiatives designed to protect them, and not by further study. Of course, as a preliminary step, more accurate characterization of at-risk communities is needed, but that should not take decades. We need local, regional, and national demographic studies¹⁷⁸ that identify the large proportion of the general population, and of minorities in particular, who are categorized as sensitive subpopulations. Then, without further assessment, we need to protect these most vulnerable groups by setting standards that reduce environmental health risks to these vulnerable populations with an adequate margin of safety, taking into account all that we currently know.

177. Proposed Guidelines for Assessing Female Reproductive Risk, 53 Fed. Reg. 24,834, at 24,835 (1988). After discussing the various events in the female reproductive cycle which could be disrupted by exposure to toxicants, the guidelines conclude "it seems prudent for the Agency to minimize exposures to agents having the potential for adversely effecting the female reproductive system." *Id.*

178. Comprehensive demographic studies might only require taking an inventory of the mass of existing studies.