An American Evolution – Environmental Rights Chapter
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Introduction

This chapter attempts to give the reader a broad understanding of the nature and definition of a constitutional environmental right, what it would guarantee, whether it should be considered a human right. It goes on to discuss if environmental rights claims could be protected under existing legislation, the process of amending the U.S. Constitution, who currently has environmental rights, and finally the difficulties associated with these rights. The intention of this chapter is to provide an educated conclusion as to the relevance, need, feasibility, and barriers associated with constitutional environmental rights.

Keep in mind that this chapter has not been written or compiled by an attorney, so legal issues are merely illustrated, not exhaustively explored. Additionally, this chapter focuses on the broad aspects of constitutional environmental rights. There are many other issues, problems, costs, and benefits associated with these rights which are not discussed in this chapter.

Nature and Definition of Environmental Rights

Definition of ER

A constitutionally guaranteed environmental right could be worded in many different ways. The wording of the right would shape its duties and scope. Tim Hayward, a scholar devoted to environmental rights, prefers the definition of environmental rights referenced in the Brundtland report of 1987:

> '**All human beings have the fundamental right to an environment adequate for their health and well-being**'[1].

While other definitions have been posed, a right worded in this particular way has been used most frequently by international organizations. This is the definition of the environmental right that I will be working with in this chapter. An environmental right worded like this would be a useful tool with respect to pollution, waste disposal, toxic contamination and other environmental risks to human health and well-being.

Many health risks are present from environmental contamination of air, water and food (see the Public Health Chapter). A constitutional environmental right would take great steps to curtail negative health exposures, by creating accountability, encouraging precautionary contamination levels, and setting up pathways of legal redress. Constitutional environmental rights would also do a great deal to eliminate environmental justice and future generation inequity concerns. Depending on how 'health' and 'well-being' are legally defined, other environmental issues could be protected under the right. Such issues, under a liberal definition, could include quality of life concerns, aesthetics,

[1] World Commission on Environment and Development, *Our Common Future* (1987), Oxford University Press, p. 348

cultural and spiritual issues related to the environment[2]. However, a constitutional environmental right is not a cure for all aspects of environmental concern.

Generations of rights

The nature of an environmental right is complex. Human rights are classified in generations[3]. 'First generation' rights in the United States include personal liberties such as civil and political rights. These first generation rights are negative rights, ones that the government cannot infringe or act upon. An example is freedom of speech, in which the government must abstain from acting against a person freely exercising. 'Second generation' rights mandate government action and usually involve economic or social rights. These second generation rights usually concern themes of equality. They are positive rights, requiring the government to act. An example of these rights is the right to be employed, in which the government must take actions to ensure that disabled or handicapped people can secure themselves employment. 'Third generation' rights are collective in nature, which goes against the traditional understanding of individual human rights. They can require positive and negative actions from the government. So the government may be required to act in some instances and prohibited from acting in others. These rights usually concern society as a whole and the union of interests affecting all people. Examples of third generation rights include the right to a reasonable environment, economic development, common heritage of mankind, humanitarian assistance, etc. These third generation rights are extremely hard to implement because of the combination of positive and negative duties imposed on the government. In fact, third generation rights do not exist in practice in the United States. International law does recognize third generation rights. An example of which is the 'right to self-determination' guaranteed in the African Charter of Human and Peoples' Rights of 1981. Things to consider with respect to formulating a third generation right are delineating the positive and negative duties of the government. The development of a U.S. environmental right will be difficult and unprecedented: this is not to say that the feat is impossible or unworthy of undertaking.

Weak Anthro

A U.S. environmental right would be considered an anthropocentric right, because it considers only human health and well-being, not the environment 'for its own sake'. An ecocentric environmental right would be worded more as a 'right OF nature' rather than a 'right TO nature'. This distinction is important since legal authorities would probably be more likely to oppose the economic interests of an entity to protect the rights of human than the rights of animals or plants[4]. An anthropocentric right can have two further distinctions, 'weak' or 'strong' anthropocentrism. Strong anthropocentrism, also called the utilitarian view, would consider only the interests of humans and excludes the interests of nonhumans and the environment for its own sake. The utilitarian view only considers the short-term value of all variables of the ecosystem. By this view, the environment is seen as a life-support system for humans, to be manipulated and used in whatever way humans feel is to their best interests. The focus of 'weak' anthropocentrism is on human interests, but it does consider nonhuman and

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[2] Hayward, Tim, "Constitutional Environmental Rights: A Case for Political Analysis", Political Studies, 2000, Vol. 48, p.559

[3] Shelton, Dinah, "Human Rights, Environmental Rights, and the Right to Environment", Stanford Journal of International Law, 1991-1992, Vol. 28, p.122

[4] Carnegie Council Website - Apple B, Commentary on 'The enforceability of environmental rights", located at http://www.carnegiecouncil.org/viewMedia.php/prmTemplateID/8/prmID/4464 accessed on February 22, 2006

environmental interests. This view acknowledges that humans are integrally linked to the environment and cannot be separated from it. Weak anthropocentrism maintains that if relatively subordinate human interests conflict with essential interests of nonhumans or the environment, priority could be given to the non-human or environmental interests[5]. 'Weak' anthropocentrism generally recognizes that,

> "human interests are inseparable from the good of the nonhuman constituents of the environment in many ways, some of which we may not yet be aware of, so that a reasonable working presumption (which is absent from 'strong' anthropocentrism) is that where there is not a serious cost in human terms there is a positive reason actively to show concern for features and constituents of the nonhuman environment, regardless of whether humans stand to derive any immediate benefit."[6]

Global effort ultimately

Ultimately, the nature of environmental rights requires a concerted International effort towards preservation and protection. This is due to the interdependence of environmental sectors, trans-boundary effects of environmental harm, and such complex and compounding phenomena as ozone layer depletion and global warming[7]. These factors illustrate how regional environmental protection is beneficial, but not a cure in the face of global damage. Many sectors of the economy serve to negatively impact the environment. The processing of raw materials, fuel use, mining and timber practices, transportation and distribution methods, industrial processes, consumer consumption patterns, product life cycles, and many other common practices of the modern world work together to affect and harm the environment. Pollution in one region can migrate and affect many other regions. Thus environmental protection measures in the United States do not ensure that pollution from other countries will not affect our land and populations. Lastly, ozone layer depletion and global warming have real and significant impacts for the whole of humanity. These problems will not subside unless all actors work to make necessary changes. With these three factors in mind one can understand that problems related to environmental degradation will not be accurately addressed until there is a cohesive international effort. Fortunately, much of the rest of the world has already begun to act[8]. As both a world superpower and cultural icon, the United States has significant influence on the world stage. As the world's leading consumer and polluter, the United States the ability to set a revolutionary (or evolutionary) precedent by enacting a constitutionally guaranteed environmental right. Implementing a constitutionally guaranteed environmental right in the United States could not only improve the domestic environmental situation, but could also prove instrumental in improving the environmental quality of the entire world.

It is important to understand that environmental rights are not a cure-all for the gamut of environmental problems. They should be looked at as an approach to solving environmental problems by strengthening existing regulations, spurring the creation of new regulations, signaling national commitment to environmental ideals, and enhancing

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[5] Hayward, Tim, *Constitutional Environmental Rights*, Oxford University Press, Great Britain, 2005, p.33
[6] IBID, Hayward p.33
[7] Shelton, Dinah, "Human Rights, Environmental Rights, and the Right to Environment", Stanford Journal of International Law, 1991-1992, Vol. 28, p.107
[8] See the Kyoto Protocol and the following United Nations Documents: Stockholm Declaration, Brundtland Report, Convention on the Rights of the Child, Draft Declaration of Principles on Human Rights and the Environment, & Aarhus Convention.

the probability of success of positive environmental outcomes. This can be understood by realizing that successful outcomes in human or nonhuman environmental concerns depend on the political, legal, and economic resources available to humans championing the case. Environmental rights will serve as a considerable tool for humans to use. It is also possible that once an environmental right is adopted into the U.S. Constitution, social norms and practical legal philosophy will evolve progressively to handle further environmental aims.

What Should Environmental Right Guarantee?

It is logical that an environmental right would mandate certain duties and guarantees to the people that it protects. An effective environmental right must include duties, and procedural and substantive rights[9]. Additionally, an environmental right should offer injunctive relief and mechanisms to collect damages from infringing parties[10]. In order to evade the inherent difficulties in enforcing environmental rights, the definition, scope, and guarantees afforded by the right must be stated clearly. The more precise a right is formulated the less ambiguity will result, followed by accurate judicial interpretation. I am unqualified to formulate a completely comprehensive and feasible environmental right. This task should be undertaken by a collective effort, including members from all affected sectors (government, businesses, citizens, foreigners, etc). The collective effort must address the establishment of duties, and procedural and substantive rights when formulating a comprehensive environmental right.

Duties

Constitutional rights have corresponding duties attached to them. These duties must be granted or protected by the state, individuals or other non-state entities, to protect the public. Duties can be positive or negative. A positive duty is one that requires action. For example, when a person is arrested, they have the right to an attorney, it is the duty of the state to provide that person with an attorney if they cannot afford one on their own. A negative duty is one that prevents action. For example, the right to free speech requires that no one prevent a person from exercising that right. The primary duties associated with an environmental right would require the state to, "implement and enforce laws that secure to the individual the enjoyment of what is intended as the substance of the right"[11].

Procedural rights dictate how the government or legal entities should operate. These rights ensure fair and consisted application of due process and justice to all cases that come before a court. These rights would help illustrate proper procedure for lawful enforcement of an environmental right. Proper procedure is very important. Incorrect procedure may violate a person's right to privacy, free speech, or other basic human rights. Improper procedure can also force the courts to exclude evidence, dismiss a case, or decide against legitimate case. Dinah Shelton believes that procedural rights of an effective environmental right should require informed consent and political participation

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[9] IBID, Shelton p. 117

[10] Carnegie Council on Ethics and International Affairs Website - Apple, Betsy, "Commentary on "The enforceability of environmental rights" located at http://www.carnegiecouncil.org/viewMedia.php/prmTemplateID/8/prmID/4464 accessed on February 24, 2006

[11] Hayward, Tim, "Constitutional Environmental Rights: A Case for Political Analysis", Political Studies, 2000, Vol. 48, p.560

of those affected by an environmental decision[12]. Shelton outlines 3 procedural rights that an environmental right should guarantee; 1) a right to prior knowledge of such action, with corresponding state duty to inform, 2) a right to participate in decision-making, and 3) a right to recourse before competent administrative and judicial bodies[13]. Provisions must also be made to enable an injunction mechanism for immediate procedural guarantees against action causing environmental degradation[14]. This would not prevent entities from secretly carrying out environmentally harmful projects, but it would give the public the ability to halt such projects once they become aware of them. This injunction would stand until the project could be properly investigated, environmental damages assessed, public participation and information enabled, and damages sought if necessary.

Shelton maintains that even with the above-mentioned procedural guarantees, two questions still remain to be answered; 1) how do the rights to information and participation apply to individuals outside of those immediately affected, and 2) who makes the final decision about projects affecting the environment and are there substantive limits to decision maker actions?[15] The first question addresses an issue related to the trans-boundary nature of the environmental degradation. Environmental harm or pollution can originate in one area, but affect many more areas. Pollution from industrial emissions in Detroit can affect the Detroit region, but can also harm areas in the Northeastern United States and even Canada (non-nationals). The trans-boundary nature of environmental harm requires that provisions be enacted to afford those outside of the state of jurisdiction (or country of jurisdiction) some means of obtaining information, input in decision-making, and legal recourse if damages arise. This requirement could mandate that emitters of pollution or providers of environmental damage forecast how the pollution they produce will migrate. If foreign states or countries are affected, information, participation, and redress must be provided accordingly. Correspondingly, the first question posed by Shelton touches on the issues of the rights of non-citizens. The second question posed by Shelton involves an international scenario. By this perspective, international treaties that establish customary norms and standards would place limits on decision makers. Final decision on environmental issues would come from the state of jurisdiction. However, that state would be restricted by the limits set by international treaties. Absent of norms and standards set by international treaties, the second question posed by Shelton remains unanswered for a domestic scenario. In the United States the state supreme court would have preeminent jurisdiction, with appellate courts and the Federal Supreme Court following. The substance of the federal environmental right and the federal administration tasked to enforce such a right (the U.S. Environmental Protection Agency) would impose limits on state decision makers. Federal laws set protection mandates such as limits on pollution. States must abide by those federal regulations, but are allowed to create stricter protection mechanisms and limits.

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[12] Shelton, Dinah, "Human Rights, Environmental Rights, and the Right to Environment", Stanford Journal of International Law, 1991-1992, Vol. 28, p.117
[13] IBID, Shelton p.117
[14] IBID, Shelton p.117
[15] IBID, Shelton p.119

Substantive rights are basic rights affording individuals the power to possess or do certain things. Substantive rights and laws establish principles, create and define rights, and set limitations under which society is governed. Substantive rights allow individuals to exercise given rights despite the fact that the government may not desire them too. For example, the government may not want the press to report about government corruption, but the First Amendment that guarantees freedom of the press insures that the media can carry out their reports. Other examples of substantive rights are freedom of speech, religion, and the right to life and liberty. Some substantive rights are difficult to define, but methodical, comprehensive and complete consideration in forming the definition of such rights allows for smoother implementation and enforcement. These rights are considered independent and often superior to the rest of human law.

Some substantive issues with environmental rights can be reflected by the findings of the Office of the United Nations High Commissioner for Human Rights (OHCHR) meeting of experts on Human Rights and the Environment. One function of this meeting was to outline basic matters of importance regarding human rights and the environment. By elevating environmental rights to human rights status, the OHCHR qualifies environmental rights as having paramount status. The link between human rights and the environment (discussed in detail later in this chapter) is built on the fact that many national and international jurisdictions recognize that the right to a healthy environment is a fundamental human right. The following substantive matters ensue; 1) litigation should be allowed based on this right and facilitating its enforceability in domestic law by liberalizing provisions regarding 'standing', 2) acknowledging that other human rights recognized in domestic legal systems can be violated as a result of environmental degradation (right to property, privacy, life)[16]. Furthermore, the OHCHR maintains that environmental sensitivity training should be provided for judges, lawyers and public officials[17]. The issue of standing regards who is allowed to file suit. Only people with standing over an issue have the right to follow an environmental lawsuit. In the United States standing is determined by the plaintiff's alleged injury, causation, and redressability. There are also considerations of jurisdiction (zone of interest) and proving a plaintiff's own interest (not a third party interest). By liberalizing, or expanding the definition of who has standing, more people will be able to legally file suit and exercise their rights. Limiting standing serves to minimize substantive rights, not extend them. The second issue relates to that fact that nature and the environment are inherently linked to human existence. Therefore, established basic human rights may be violated if the environment is degraded. For example, a person's right to property or privacy may be violated if pollution from a neighboring property migrates to his or her own property.

Injunctive relief and damages

Mechanisms for injunctive relief and damages should be guaranteed in a properly constructed environmental right. Injunctive relief is a court ordered prohibition of activity or condition. Injunctions could be used to stop a polluter from operating, prevent a development from being built, or temporarily cease other actions that may be harmful to the environment and public health. Once an injunction is granted a hearing is undertaken where both sided of the issues argue their points of view. An injunction can

[16] Office of the United Nation High Commissioner for Human Rights Website – Final Text (Jan 16, 2002) of the "Meeting of Experts on Human Rights and the Environment" located at http://www.ohchr.org/english/issues/environment/environ/conclusions.htm accessed on February 14, 2006

[17] IBID, OHCHR Website, Assessment #15

also be a part of a lawsuit. The injunction proceeding determines whether the cease of operations stands or is dismissed. Allowing for injunctive relief would enable some potentially negative environmental issues from coming to fruition. Not all injunctions would permanently stop harmful operations. Injunctions would afford citizens, with 'liberal' standing, the chance to temporarily cease operations until the full extent of environmental and public health impacts could be assessed.

Damages provisions would legally require citizens to receive a sum of money if their rights have been breached and harm has been done. Compensatory damages would attempt to compensate a citizen for any harm they have suffered. So if a person was poisoned by pollutants leaching into their well-water, the entity responsible for the pollutant release would be liable for damages. Compensatory damages would require that entity to give an amount of money equal to any hospital or medical bills the person accrued as well as a court-determined sum for pain and suffering inflicted on the person. Punitive damages are meant to punish a person or entity for their wrongdoing. So if it could be proved that the entity above was aware of the pollutant discharge and the negative health effects that could occur from it, punitive damages could be sought. The amount of punitive damages awarded would be determined by court proceedings. It is important to note that both compensatory and punitive damages should be included in the environmental rights provision, not just 'actual damages' which includes only compensatory damages.

Duties, procedural and substantive rights, and injunction and damages mechanisms are all things that should be guaranteed to each citizen and immigrant under a constitutional environmental right. There are other things, reforms specifically, that should be guaranteed at the inception of an environmental right. These include, but are not limited to the reevaluation of pollution standards, reform of traditional cost-benefit analysis practices, and the manifestation of insulating environmental protection goals from short-term political and economic will. An environmental right should guarantee that pollution standards be set using the precautionary principle of preventing and anticipating harm. Thresholds of acceptable risk are extremely hard to determine, however, this should not be deterrence. Thresholds should be set based on the most sensitive groups of the population, namely children, the sick and the elderly. Thresholds limits should also consider the compound affects of multiple sources emitting regulated levels. A further discussion of pollution limit setting is later in this chapter.

Pollution standards

Environmental cost-benefit analysis reform should be guaranteed to take place at the inception of an environmental right. Traditional methods employed by the Office of Management and Budget have historically undervalued environmental inputs (see the Economics chapter of this book). Most notably these under-valuations have been with respect to deriving consumer demand for environmental services, future generation preferences, perfect and poor substitutability of environmental outputs, environmental weights, and methods of valuing non-market goods. A complete discussion of the impacts of improper cost-benefit analysis is included in the economics chapter of this book. Proper cost-benefit analysis mechanisms are instrumental in establishing an environmental right. This is because the government has limited resources and must allocate them efficiently. While environmentalists would maintain that no cost considerations should be included with respect to environmental protection, this is an impossibility. Resources spent to protect the environment will be diverted from other

CBA reform

uses. If no cost considerations were imposed, funds could be drained improperly from all areas of the economy. While environmental protection is extremely important, the poor should not go hungry or the injured should not go untreated in favor of incremental improvements in environmental quality (this should not be construed to read that universal healthcare should be achieved before an environmental right). Costs and benefits of regulatory measures must be considered, but in a reformed manner from traditional methods. Weights should be assigned to measure the relative importance of each environmental issue. For example, the protection of lightly polluted rural watersheds in Pennsylvania might have a weight of two, while the protection of the entire Colorado River (which supplies water to most of the West Coast) may have a weight of seven. This would allow for an increasing level of benefit allocation in environmental cost-benefit analysis.

Insulating from Political will

Most importantly, a constitutional environmental right will help guarantee that short-term political pressure and economic considerations of external actors will not trump long-term environmental concerns. While this is almost impossible to guarantee in the definition and implementation of an environmental right, great lengths will be achieved towards this end by simply establishing the right. Currently, the U.S. Environmental Protection Agency is tasked with protecting the environment. However, it operates under presidential directives to achieve congressionally set goals. Often the goals set by congress are not always the same as the goals envisioned by the executive branch. This disconnect results in many goals not being reached. The EPA has no underlying right to protect or direct its operations, and it does not have much input in formulating goals set by congress. This lack of authority and autonomy exposes the EPA to many pressures, most notably from the executive branch, followed by congress and then the judiciary. Environmental norms and directives change with each administration, leaving the EPA to float on partisan tides. Establishing and environmental right would give substance and authority to the EPA, solidifying its directives and insulating it from political will. This is because mechanisms of accountability, legal redress, information and public involvement would be guaranteed to all citizens and domestic residents. Politicians would be less likely to manipulate environmental issues for fear of infringing upon the rights of the citizens. Of course it is still possible that political pressure will be able to affect environmental protection regulations and outcomes. However, the establishment of a human rights-based environmental right would drastically reduce this possibility. Even if the constitutional right in question was relatively undefined and had no self-executing mechanisms, it would still have considerable symbolic value and compelling quality[18]. Among other things, it would afford a significantly larger amount of power to the Environmental Protection Agency as well as increasing the agency's ability to set and achieve its own independent goals. Reference the Government chapter of this book for more information about the relationship between the EPA and the various branches of government.

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[18] National Library for the Environmental Website – "Right to a Clean Environmental Provisions in State Constitution, and Arguments as to a Federal Counterpart", Robert Meltz, February 23, 1999 located at http://digital.library.unt.edu/govdocs/crs//data/1999/upl-meta-crs-1023/RS20084_1999Feb23.html?PHPSESSID=22dc576d84587e723917cf03ed855398#25 accessed on February 28, 2006

Is an Environmental Right a Human Right?

Is ER a human right

Human rights are the assertion that human beings have inherent and universal rights independent of ethnicity, nationality or jurisdiction. The question arises as to whether environmental protection is an appropriate subject of a human right, such as those guaranteed in the U.S. Constitutions Bill of Rights. An intuitive, philosophical response to this would be that since humans need the environment to live, the environment should be preserved, and deserves the protection afforded by a human right. Human rights also have the feature of non-negotiable values, which is desperately needed for effective environmental protection. Environmental legislation can often be undermined by political will and economic pressure. Granting environmental rights 'human right' status would give them 'trumping' power over competing agendas.

The first distinguished statement supporting the idea of an environmental human right was in Principle I of the 1972 Stockholm Declaration at the UN Conference on the Human Environment;

> "Man has the fundamental right to freedom, equality, and adequate conditions of life, in an environment of quality that permits a life of dignity and well-being, and he bears a solemn responsibility to protect and improve the environment for present and future generations."[19]

This principle echoes the notions of the public trust doctrine, which maintains that the environment should be protected for the benefit of future generations. The 1987 Brundtland Report presented the fundamental goals of the environmental movement as a continuation of the human rights agenda. The Brundtland Report gave a definition of environmental rights, but went on to delineate 3 main components to environmentalism. These components consist of ecological equilibrium, sustainable development, and an environment suitable for the development of the person.

The 1989 UN Convention on the Rights of the Child, in Article 24, defines the right of a child to 'the highest attainable standard of health', which requires 'taking into consideration the dangers and risks of environmental pollution'[20]. This treaty was ratified by 190 of 192 participating countries[21]. This widely accepted treaty further bolsters the claim of an environmental right as a genuine human right. It also acknowledges that children are particularly susceptible to environmental pollution (for more on this read the Public Health chapter of this book).

Recently, the U.N. Commission on Human Rights presented a report, 'Draft Declaration of Principles on Human Rights and the Environment'[22]. This document was drafted on May 16, 1994 by an international group of human rights and environmental

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[19] United Nations Environment Programme Website – Declaration of the United Nations Conference on the Human Environment, located at http://www.unep.org/Documents.multilingual/Default.asp?DocumentID=97&ArticleID=1503 accessed February 7, 2006

[20] Hayward, Tim, "Constitutional Environmental Rights: A Case for Political Analysis", Political Studies, 2000, Vol. 48, p.560

[21] United Nations Website - Office of the United Nations High Commissioner for Human Rights, "Status of Ratifications of the Principle International Human Rights Treaties" located at http://www.unhchr.ch/pdf/report.pdf accessed January 30, 2006

[22] A copy of this Declaration can be found Tufts University Website – located at http://fletcher.tufts.edu/multi/www/1994-decl.html accessed on January 25, 2006

protection experts. It was the first ever declaration of principles of human rights and the environment. It describes the environmental dimension of existing human rights (right to life, culture, health) and details the procedural rights necessary for the implementation of substantive rights. The declaration also describes duties of individuals, governments, international organizations and transnational corporations, which correspond to the rights. The Declaration outlines the following principles;

Part I

1. Human rights, an ecologically sound environment, sustainable development and peace are interdependent and indivisible.
2. All persons have the right to a secure, healthy and ecologically sound environment. This right and other human rights, including civil, cultural, economic, political and social rights, are universal, interdependent and indivisible.
3. All persons shall be free from any form of discrimination in regard to actions and decisions that affect the environment.
4. All persons have the right to an environment adequate to meet equitably the needs of present generations and that does not impair the rights of future generations to meet equitably their needs.

Part II

5. All persons have the right to freedom from pollution, environmental degradation and activities that adversely affect the environment, threaten life, health, livelihood, well-being or sustainable development within, across or outside national boundaries.
6. All persons have the right to protection and preservation of the air, soil, water, sea-ice, flora and fauna, and the essential processes and areas necessary to maintain biological diversity and ecosystems.
7. All persons have the right to the highest attainable standard of health free from environmental
8. All persons have the right to safe and healthy food and water adequate to their well-being.
9. All persons have the right to a safe and healthy working environment.
10. All persons have the right to adequate housing, land tenure and living conditions in a secure, healthy and ecologically sound environment.
11. All persons have the right not to be evicted from their homes or land for the purpose of, or as a consequence of, decisions or actions affecting the environment, except in emergencies or due to a compelling purpose benefiting society as a whole and not attainable by other means. All persons have the right to participate effectively in decisions and to negotiate concerning their eviction and the right, if evicted, to timely and adequate restitution, compensation and/or appropriate and sufficient accommodation or land.
12. All persons have the right to timely assistance in the event of natural or technological or other human-caused catastrophes.
13. Everyone has the right to benefit equitably from the conservation and sustainable use of nature and natural resources for cultural, ecological, educational, health, livelihood, recreational, spiritual or other purposes. This Includes ecologically sound access to nature. Everyone has the right to preservation of unique sites, consistent with the fundamental rights of persons or groups living in the area.
14. Indigenous peoples have the right to control their lands, territories and natural resources and to maintain their traditional way of life. This includes the right to security in the enjoyment of their means of subsistence. Indigenous peoples have the right to protection against any action or course of conduct that may result in the destruction or degradation of their territories, including land, air, water, sea-ice, wildlife or other resources.

Part III – {touches on procedural rights}

15. All persons have the right to information concerning the environment. This includes information, howsoever compiled, on actions and courses of conduct that may affect the environment and information necessary to enable effective public participation in environmental decision-making. The information shall be timely, clear, understandable and available without undue financial burden to the applicant.
16. All persons have the right to hold and express opinions and to disseminate ideas and information regarding the environment.
17. All persons have the right to environmental and human rights education.
18. All persons have the right to active, free, and meaningful participation in planning and decision-making activities and processes that may have an impact on the environment and development. This includes the right to a prior assessment of the environmental, developmental and human rights consequences of proposed actions.
19. All persons have the right to associate freely and peacefully with others for purposes of protecting the environment or the rights of persons affected by environmental harm.
20. All persons have the right to effective remedies and redress in administrative or judicial proceedings for environmental harm or the threat of such harm.

Part IV - {touches on duties}

21. All persons, individually and in association with others, have a duty to protect and preserve the environment.
22. All States shall respect and ensure the right to a secure, healthy and ecologically sound environment. Accordingly, they shall adopt the administrative, legislative and other measures necessary to effectively implement the rights in this Declaration.

    These measures shall aim at the prevention of environmental harm, at the provision of adequate remedies, and at the sustainable use of natural resources and shall include, *inter alia*,

    - collection and dissemination of information concerning the environment
    - prior assessment and control, licensing, regulation or prohibition of activities and substances potentially harmful to the environment;
    - public participation in environmental decision-making;
    - effective administrative and judicial remedies and redress for environmental harm and the threat of such harm;
    - monitoring, management and equitable sharing of natural resources;
    - measures to reduce wasteful processes of production and patterns of consumption;
    - measures aimed at ensuring that transnational corporations, wherever they operate, carry out their duties of environmental protection, sustainable development and respect for human rights; and
    - measures aimed at ensuring that the international organizations and agencies to which they belong observe the rights and duties in this Declaration.

23. States and all other parties shall avoid using the environment as a means of war or inflicting significant, long-term or widespread harm on the environment, and shall respect international law providing protection for the environment in times of armed conflict and cooperate in its further development.
24. All international organizations and agencies shall observe the rights and duties in this Declaration.

Part V

25. In implementing the rights and duties in this Declaration, special attention shall be given to vulnerable persons and groups.
26. The rights in this Declaration may be subject only to restrictions provided by law and which are necessary to protect public order, health and the fundamental rights and freedoms of others.

27. All persons are entitled to a social and international order in which the rights in this Declaration can be fully realized.

Broad in scope, these principles were declared as a standard-setting activity to explore creating effective means by which to enforce and implement them. This document can be an important tool for the United States to use in developing its own constitutional environmental right, due to its depth and detail. Additionally, the international community could develop a legally enforceable human right to protect the environment. However, this seems logistically more difficult then developing a domestic constitutional environmental right. For it's purpose in this chapter, the Declaration is used to show how human rights and the environment are closely linked. Furthermore, this document shows that this relationship has been recognized and authenticated by the preeminent international organization, the United Nations.

In 1998 the United Nations Economic Commission for Europe (UNECE) held the Aarhus Convention, also known as the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters. This convention 'links environmental rights and human rights', recognizes current obligations to future generations, proclaims that sustainable development can only be reached if all stakeholders participate, links government accountability with environmental protection, and establishes methods to increase public participation in international environmental agreements[23]. This agreement establishes procedural rights, rights to information, rights to participation in decision-making, and rights to access to justice in environmental matters. While these rights do not encompass a comprehensive environmental right, they do establish fundamental rights that are necessary to securing the right to a healthy environment.

The preamble of the Aarhus Agreement makes two very important assertions that inextricably link environmental rights with human rights:

- Recognizing that adequate protection of the environmental is essential to human well-being and the enjoyment of basic human rights, including the right to life itself.
- Recognizing also that every person has the right to live in an environment adequate to his or her health and well-being, and the duty, both individually and in association with others, to protect and improve the environment for the benefit of present and future generations.[24]

The UN asserts that this document is not only about environmental and human rights, but also about government accountability, transparency and responsiveness[25]. This is apparent through the Agreement's three main objectives (or pillars): access to information, public participation in decision–making, and access to justice.

The access to information pillar stipulates a government's responsibility to supply the public with requested information within a specific time limit. Among other things

[23] United Nations Economic Commission for Europe Website, "Aarhus Convention", located at http://www.unece.org/env/pp/ accessed on February 13, 2006
[24] United Nations Economic Commission for Europe Website – "Aarhus Convention Full Text", located at http://www.unece.org/env/pp/documents/cep43e.pdf accessed on February 13, 2006
[25] United Nations Economic Commission for Europe Website, "Aarhus Convention", located at http://www.unece.org/env/pp/ accessed on February 13, 2006

the access pillar also defines forms of information, reasonable charges for information, exemptions, refusals, referral processes, and duties of public offices to keep up to date with environmental information. The public participation pillar sets minimum requirements for public participation in various environmental decision making categories such as: specific projects/activities, programs and policies, and general rules and regulations. These requirements include but are not limited to; timely and effective notification of the public concerned, reasonable timeframes for participation, the right of the public concerned to inspect relevant information free of charge, the obligation of public officials to take due account of the outcome of the public participation, and prompt public notice of the decision including the rationale on which the decision was based on. Lastly, the access to justice pillar attempts to provide justice in three contexts: review procedures with respect to information requests, review procedures with respect to specific decision (which are subjected to public participation requirements), and challenges to breaches of environmental law. This last pillar serves to enforce the first two and gives citizens and Nongovernmental Organizations (NGOs) power to uphold the law[26].

Aarhus has been ratified by 39 countries including; Greece, Switzerland, Sweden, Norway, the United Kingdom, Germany, Latvia, Romania, etc. The United States has not ratified the Aarhus Convention at the time of my research. Most recent amendment to the Aarhus Convention was the extension of the rights of public participation in decision-making on genetically modified organisms (GMOs). Also added to Aarhus was the Protocol on Pollutant Release and Transfer Registers and the "Environmental Democracy" clearinghouse, used to promote ideas and awareness about Aarhus covered issues. Aarhus represents the concerted thoughts and actions of a proactive eastern society focused on basic human rights, such as the right to a healthy environment.

These United Nations documents and treaties (Stockholm Declaration, Brundtland Report, Convention on the Rights of the Child, Draft Declaration of Principles on Human Rights and the Environment, & Aarhus Convention) do not constitute an International law recognizing an adequate environment as a human right. However, they do show a progressive pattern of movement towards this end.

Scholars have noted that international human rights norms from ratified binding treaties and customary international law have been used as evidence to inform or influence the definition of U.S. constitutional norms[27]. Apparently, this influence is more readily observed in cases involving international concern, rather than purely domestic concerns. *Reid v. Covert*[28] illustrated how international treaties could not diminish or restrict domestic constitutional rights. However, international treaties can serve to fill gaps or expand protections not covered in U.S. law[29]. Lillich cites Bert B. Lockwood Jr.[30] as identifying that international treaties (like the United Nations Charter) have significantly influenced state and federal judicial interpretations of constitutional provisions, though those international documents are rarely referenced. Lockwood

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[26] IBID – UNECE Website
[27] R.B. Lillich & H. Hannum, "Linkages between International Human Rights and U.S. Constitutional Law", The American Journal of International Law, Vol. 79, No. 1, Jan 1985, p.159
[28] 354 U.S. 1 (1957)
[29] OpCit, Lillich, p. 159
[30] Lockwood Jr., Bert B. , "The United Nations Charter and United States Civil Rights Litigation: 1946-1955", 69 Iowa Law Review, Vol. 901 , 1984

believes that this lack of reference is because the judiciary is hesitant to admit the greater role of international law, because these laws are out of the control of the United States. Essentially, referencing international treaties in U.S. court would undermine United States sovereignty.

Can Environmental Rights Be Exercised Using Existing Rights?

There are many existing environmental laws in the United States. It has been suggested that new protection under a broadly worded federal constitutional environmental right may not be able to add much to the thousands of pages of existing environmental statues and regulations[31]. Some laws serve to regulate and standardize environmental processes, some set pollution limits, some prohibit environmentally harmful behaviors, and others attempt to give rights to hose who suffer from environmental harms. The Alien Tort Claims Act and Executive Order 12898 are examples of attempts to ensure rights, where property rights are an example of aims to prevent harm. In practice these mechanisms could not prove successful at achieving constitutional environmental rights guarantees.

The Alien Tort Claims Act (ATCA) of 1789 grants jurisdiction to U.S. Federal Courts over " any civil action by an alien for a tort only, committed in violation of the law of nations or a treaty of the United States". A tort is a civil wrong or wrongful act resulting intentionally or unintentionally, in which injury occurs. Some intentional torts can also be considered criminal acts. The ATCA has been successfully used to prosecute violations of well-established first generation human rights (torture, summary judgment), but has been less successful with environmental claims. *Aguinda v. Texaco* attempted to address the environmental irresponsibility of the multinational corporation, Texaco, whose actions negatively affected Ecuadorian citizens. Texaco spilled over 3,000 gallons of oil per day in Oriente, Ecuador from 1972 to 1992[32]. These environmental indiscretions resulted in negative health outcomes for many Ecuadorian citizens. While cases similar to *Aguinda* have been brought to U.S. courts, none of them has successfully upheld environmental concerns. Most have failed on procedural or substantive grounds[33].

Though the environmental cases that have been brought under the ATCA have been extreme, like *Aguinda*, they have not proven to be effective means of legal redress because of state sovereignty issues. International law affords nation states sovereignty over their natural resources. Some international human rights instruments allow for impingements of sovereignty for extreme human rights violations, but none address the environment in particular[34]. Although there are some international instruments that assert

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[31] National Library for the Environmental Website – "Right to a Clean Environmental Provisions in State Constitution, and Arguments as to a Federal Counterpart", Robert Meltz, February 23, 1999 located at http://digital.library.unt.edu/govdocs/crs//data/1999/upl-meta-crs-1023/RS20084_1999Feb23.html?PHPSESSID=22dc576d84587e723917cf03ed855398#25 accessed on February 28, 2006

[32] Osofsky, Hari, "Environmental Rights Enforcement in U.S. Courts", Human Rights Dialogue, Spring 2004, p. 30

[33] IBID, Osofsky p.30

[34] IBID, Osofsky p. 30

environmental rights as part of customary international law, U.S. courts refuse to recognize these claims. Foreign victims of injustices by U.S. multinational corporations are unable to receive compensation for damages because of judicial interpretation (failure to see environmental wrongs as human rights violations) and discretion. Even in environmental cases where violations of customary international law were recognized, like *Sarei v. Rio Tinto*, the plaintiffs were not able to gain redress. Clearly, the ATCA is not a sufficient instrument to protect domestic or foreign environmental rights.

Executive Order 12898 was enacted by President Clinton to address environmental justice. Environmental justice is defined as:

> "The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies."

The intent of environmental justice is to prevent minority and low-income persons from being marginalized with respect to environmental issues. The learn more about environmental justice, see the environmental justice chapter of this book.

Executive orders have been issued since 1789, though the constitution gives no direct provision for such issuance. The President of the United States, to direct the operations of his executive officers, issues executive orders. Executive orders do not have legal force by themselves, unless acted upon by Congress. The intent of the original environmental justice executive order was to protect low-income and minority populations from being subjected to increased environmental risk. However, because this is not a legal right or law, the executive order has been diluted by subsequent presidential administrations. In 2001, under the direction of the Bush Administration, the EPA changed the wording of the executive order to dilute the importance of low-income and minority populations[35]. As a result, the development of environmental justice programs and activities of the EPA have become stagnated and inconsistent. Many people call for the definition and direction of President Clinton's original executive order to be restated and the EPA's commitment to the order be renewed. Executive Order 12898 was supposed to granting rights to those affected by environmental harms, instead, it was undermined by political will. This is a good example of why constitutional environmental rights must be enacted. To insulate environmental regulations from political actors concerned with short-term political agendas and economic performance over long-term sustainability, in the interest of current and future generations.

Property rights

The government has used property rights to protect certain areas of land. Whether for natural conservation parks, tourist sites, to prevent development, etc, the government has acted to preserve land deemed to be valuable to the general public. Such 'regulatory takings' have prevented certain actions on private land, to the dismay of landowners. The Fifth Amendment of the U.S. Constitution requires the government compensate landowners for taking or limiting their land. However, regulatory takings of the

[35] EPA Office of the Inspector General, Evaluation Report, "EPA Needs to Consistently Implement the Intent of the Executive Order on Environmental Justice" Report number 2004-P-00007, March 2004, Executive Summary p. 5

government, for the purpose of protecting the public good, are rarely compensated for. Land-use laws have been a key tool use by the Federal government to achieve environmental protection through regulatory takings. Such laws as the Endangered Species Act (ESA) and Section 404 of Clean Water Act (CWA) are examples of such land-use laws.

Lavinge asserts that initial zoning, tax, and public works design of land use laws has inhibited United States jurisprudence from developing strong and useful mechanisms to support, analyze, or regulate cumulative effects of environmental decision-making or their impacts on future generations[36]. Property rights and land-use laws can be very controversial. They may offer means to protect environmentally desirable areas of land, yet do little to protect the health and well being of all citizens. In this sense, property rights are not a substitute for a constitutional environmental right. However, when landowners are properly compensated for government-seized land, deemed in the interest of the public good, property rights can be effective tools to enforce and implement aspects of a constitutional environmental right. Properly conceived property rights should be seen as a subordinate mechanism to realizing a dominant constitutional environmental right.

There are many existing environmental laws in the United States that deal with environmental issues on a piecemeal basis. There are laws to clean up superfund sites, regulate landfills, revitalize industrial brownfields, protect the air and water, etc. However, there is no mechanism that helps ensure the environment's place in the context of societal values as a whole. There is no regulation that addresses the susceptibility of humans to environmental harm, especially in the face of intensifying environmental degradation. This lack of specific protection opens humans and the environment up to a myriad of assaults. The environmental has no one owner who will fight for its rights and protection, nor does the environmental have the ability to articulate it's owns ills or complaints. Luckily, it is not the intent of constitutional environmental rights to protect the environment for its own sake or to address the complaints or ills of the environment. Constitutional environmental rights seek to inform, preserve and empower citizens so that they understand the importance of the environment, become interested in sustainable consumption habits to preserve the environment for themselves and future generations, and have the means to legally pursue those who abuse the environment and cause threats to human health and well being.

Methods of Amending the U.S. Constitution

A national constitution is a written document outlining the fundamental rules and principles by which a nation is governed. An amendment to a constitution is an improvement or clarification to the existing document. Amendments mandating rights typically reflect emerging social values. Ideally, a constitutional environmental right should be amended to the Bill of Rights, the first 10 amendments to the Constitution. The U.S. Constitution can be amended in two different ways, however, one of these methods has never been used before. The most common way the constitution has been amended is through the introduction and ratification of a bill by two-thirds majority of both chambers of congress (House and Senate). Once the bill has passed both houses all

[36] Lavigne, P.M., "Greening the U.S. Constitution", Conservation Biology, Vol. 17, No. 6, December 2003, p. 1485

the states then must approve it by three-fourths majority. This process can take a long time, so time limits (seven years) are often imposed.

The second allowable, but never used, method is that a Constitutional Convention is called for by two-thirds of the legislatures of the States. This Convention would propose one or more amendments, which would then go to the states to be approved by three-fourths majority. Only one amendment has specified a convention, the 21st amendment. This amendment was enacted by congress and ratified by state conventions, so it does not qualify as the second type of amendment process. The 21st amendment revoked the 18th amendment, which was the alcohol prohibition amendment. The 21st amendment stated that each state would have to ratify the 21st amendment through a convention. This allowed each state to set it's own liquor laws, prohibiting or allowing alcohol manufacturing and sales as the states saw fit.

The president has no veto or ratification power in the amendment process. Since 1789 there have been over 10,000 amendments proposed. To date, the U.S. Constitution has had 27 amendments, the first 10 are known as the Bill of Rights, 6 amendments have been disapproved. Some bills pass the House – Senate amendment process, but are not ratified by the states. These bills can remain in a state of limbo indefinitely, unless they include expiration wording. Examples of some of these dormant bills are the Slavery Amendment of 1861, the Child Labor Amendment of 1926, the expired Equal Rights Amendment of 1972. According to a study by C-Span[37] there has been a decline in the number of proposed constitutional amendments during the period from 1989 to 1999;

Congress	**Number of Proposed Amendments**
101st (1989-1990)	214
102nd (1991-1992)	165
103rd (1993-1994)	156
104th (1995-1996)	158
105th (1997-1998)	103
106th (1999)	60

Here are some amendments that were proposed in the 109th Congress (2005-2006):

- To specifically permit prayer at school meetings and ceremonies
- To allow non-natural born citizens to become President if they have been a citizen for 20 years
- To specifically allow Congress to regulate the amount of personal funds a candidate to public office can expend in a campaign
- To ensure that apportionment of Representatives be set by counting only citizens

[37] C-Span Website – Congress Facts located at http://www.c-span.org/questions/weekly54.asp accessed on February 28, 2006

- To make the filibuster in the Senate a part of the Constitution
- To provide for continuity of government in case of a catastrophic event
- The "Every Vote Counts" Amendment - providing for direct election of the President and Vice President, abolishing the Electoral College
- To clarify eminent domain, specifically that no takings can be transferred to a private person except for transportation projects
- Providing a right to work, for equal pay for equal work, the right to organize, and the right to favorable work conditions
- To allow the President to reduce any Congressional appropriation, or to disapprove of same (akin to a line-item veto)

*courtesy of www.usconstitution.net[38]

Constitutional amendments for environmental rights have been proposed before, but never formally considered. The first introduction came from Wisconsin Senator Gaylord Nelson in 1968. Senator Nelson, who also founded Earth Day, outlined 11 major issues in his "environmental agenda" to the Senate. The first item was his proposal for a constitutional amendment that read: "Every person has the inalienable right to a decent environment. The United States and every State shall guarantee this right" (H.R. J. Res. 1321, 90th Cong. 1968). In 1970 Representative Richard Ottinger proposed a broader constitutional-environmental right (H. R. J. Res. 1205, 91st Cong. 1970). Most recently Representative Jesse Jackson, Jr. proposed a constitutional amendment "respecting the right to a clean, safe and sustainable environment (H.R.J. Res 33, 108th Cong. 2003). So far, none of these measures has lead to formal action towards the ratification of an environmental amendment to the constitution.

Who Currently Has Environmental Rights?

State constitutions shape state laws, branches of government, and direct state bureaucracy. All state constitutions are subordinate to the Federal Constitution. Some rights granted in the federal constitutions are restated in state constitutions. This allows for double protection for citizen rights by both federal and state governments. An example of this is the U.S. Constitution's First amendment right to free speech, press, religion, citizen assembly, and government petition. These rights are all restated in three articles of the New York State Constitution, as well as many other state constitutions.

State constitutions are more easily amended than the federal constitution. The state constitution amendment process involves voter participation. This functional difference from the federal constitution allows state constitutions to directly reflect popular opinion, consent and control. They tend to be larger documents because they are more frequently changed. As Alexis de Tocqueville notes, the U.S. Constitution is incomplete without the existence of state constitutions[39]. This is because the state

[38] US Constitution Website – Some Proposed Amendments located at http://www.usconstitution.net/constamprop.html accessed on February 28, 2006

[39] Tocqueville, Alexis de, *Democracy in America*, ed J.P. Morgan, translated by G. Lawrence, Garden City, NY; Doubleday Anchor, 1969, p.157

constitutions define and implement many of the mandates of the U.S. Constitution. The U.S. Constitution would essentially be impotent without the state constitutions to carry out the more pragmatic aspects of everyday life and law. Some responsibilities of state constitutions include setting terms of the state executive, judicial selection, fixing debt, expenditure limits, providing for public education, formulating privacy rights, etc[40]. State constitutional law also serves as experimental grounds for new policies and programs. This is because programs can be implemented on a smaller scale to test their functionality and feasibility before they are rolled out on a national level. For a detailed explanation of the relevance of state constitutions, please reference the Government Chapter of this book.

Many states within the United States have amended their state constitutions to include environmental rights provisions. From 1970 to 1979, Hawaii, Illinois, Massachusetts, Montana, and Pennsylvania amended their constitutions to include environmental rights[41]. These rights were uniquely defined in each case. Article XI of Illinois's constitution outlines legislative responsibilities as well as the rights of individuals:

> SECTION 1. PUBLIC POLICY - LEGISLATIVE RESPONSIBILITY
>
> The public policy of the State and the duty of each person is to provide and maintain a healthful environment for the benefit of this and future generations. The General Assembly shall provide by law for the implementation and enforcement of this public policy.
>
> SECTION 2. RIGHTS OF INDIVIDUALS
>
> Each person has the right to a healthful environment. Each person may enforce this right against any party, governmental or private, through appropriate legal proceedings subject to reasonable limitation and regulation as the General Assembly may provide by law.

Illinois's Article XI section 1 addresses the public trust doctrine, the importance of protecting the environment for future generations and the government's duty in ensuring this. Section 2 addresses legal redress of the individual, limited by the General Assembly. Hawaii's Constitution addresses environmental rights in Article XI, section 9. It states that;

> Article XI, Section 9 - Each person has the right to a clean and healthful environment, as defined by laws relating to environmental quality, including control of pollution and conservation, protection and enhancement of natural resources. Any person may enforce this right against any party, public or private, through appropriate legal proceedings, subject to reasonable limitations and regulation as provided by law.

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[40] Kincaid, John, "State Constitutions in the Federal System", Annals of the American Academy of Political and Social Science, Vol 496, March 1988, p. 15

[41] Lavigne, PM, "Greening the U.S. Constitution", Conservation Biology, Vol. 17, No.6, December 2003, p.1485

The Hawaiian environmental right addresses the theme of legal redress, with legal limitations. Article XCVII of the Massachusetts Constitution states:

> Article XVII - The people shall have the right to clean air and water, freedom from excessive and unnecessary noise, and the natural, scenic, historic, and esthetic qualities of their environment; and the protection of the people in their right to the conservation, development and utilization of the agricultural, mineral, forest, water, air and other natural resources is hereby declared to be a public purpose.
>
> The general court shall have the power to enact legislation necessary or expedient to protect such rights.
>
> In the furtherance of the foregoing powers, the general court shall have the power to provide for the taking, upon payment of just compensation therefor, or for the acquisition by purchase or otherwise, of lands and easements or such other interests therein as may be deemed necessary to accomplish these purposes.
>
> Lands and easements taken or acquired for such purposes shall not be used for other purposes or otherwise disposed of except by laws enacted by a two thirds vote, taken by yeas and nays, of each branch of the general court

Montana's State Constitution provides for environmental rights in their Declaration of Rights in Article II, section 3 and later in Article IX, section 1:

> Article II, Section 3: **Inalienable rights.** All persons are born free and have certain inalienable rights. They include the right to a clean and healthful environment and the rights of pursuing life's basic necessities, enjoying and defending their lives and liberties, acquiring, possessing and protecting property, and seeking their safety, health and happiness in all lawful ways. In enjoying these rights, all persons recognize corresponding responsibilities.
>
> Article IX , Section 1. Protection and Improvement. (1) The state and each person shall maintain and improve a clean and healthful environment in Montana for present and future generations.
> (2) The legislature shall provide for the administration and enforcement of this duty.
> (3) The legislature shall provide adequate remedies for the protection of the environmental life support system from degradation and provide adequate remedies to prevent unreasonable depletion and degradation of natural resources.

Montana's provisions account for the public trust doctrine, government duties, and legal redress. Pennsylvania's Constitution addresses the public trust doctrine and governmental duties in their environmental rights provision located in Article I, section 27:

> Natural Resources and the Public Estate, Section 27 - The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment. Pennsylvania's public natural resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people.

There have been few examples of case law that have interpreted or implemented these rights. However, one positive example is provided by a decision held by Montana's Supreme Court in October 20, 1999. In *Montana Environmental Information Center et al v. Department of Environmental Quality* (DEQ) the Montana Supreme Court upheld Montana's citizens' rights to a clean and healthful environment. The Supreme Court argued that a state statue implicating environmental rights must be strictly scrutinized and can only withstand such scrutiny if the state establishes a compelling state interest. In this case the state agency (DEQ) had authorized the release of arsenic tainted water into the Blackfoot and Landers Fork rivers. This DEQ authorization was given without properly testing the discharged water. The Supreme Court concluded that,

> "based on the eloquent record of the Montana Constitutional convention… we conclude that the delegates' intention was to provide language and protections which are both anticipatory and preventative. The delegates did not intend to merely prohibit that degree of environmental degradation, which can be conclusively linked to ill health or physical endangerment. Our constitution does not require that dead fish float on the surface of our state's rivers and streams before its farsighted environmental protections can be invoked"[42].

This is an example of the judiciary following the letter and spirit in which the law was intended. Judicial interpretations can often vary with respect to the spirit of the law, which is more subjective than the letter of the law.

Many debates about state constitutional provisions for the right to a healthy environment have centered on whether that right is self-executing[43]. A self-executing right is one that can be implemented in the absence of supporting legislation. Court decisions have been mixed on this topic, but have resolved that a state constitutional provision is self-executing if it is stated as such in the wording of that right. Where the issue has not been addressed in the definition, decisions have been mixed. An example of these mixed decisions can be gleaned from a Pennsylvanian court's decision that the environmental rights provision was not self-executing[44], thus supporting the state. Three years later that court decided that the provision was self-executing and that the state had

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[42] E-Law, Environmental Law Alliance Worldwide Website – "U.S. – Montana Environmental Information Center et al v. MDEC, 296 Mont. 207, 988 p.2d 1236 (MT 1999)", located at http://www.elaw.org/resources/text.asp?id=2446 accessed on February 21, 2006

[43] National Library for the Environmental Website – "Right to a Clean Environmental Provisions in State Constitution, and Arguments as to a Federal Counterpart", Robert Meltz, February 23, 1999 located at http://digital.library.unt.edu/govdocs/crs//data/1999/upl-meta-crs-1023/RS20084_1999Feb23.html?PHPSESSID=22dc576d84587e723917cf03ed855398#25 accessed on February 28, 2006

[44] Commonwealth of Pennsylvania V. National Gettysburg Battlefield Tower, Inc., 311 A.2d 588 (Pa. 1973)

public trust responsibilities[45]. The self-executing question is integral to addressing the right to enforce, a major difficulty with respect to environmental rights. Another question related to self-executing rights of a state constitutional environmental right is whether it creates a private right of action, or is it merely a declaration of intent or policy[46]. A private right of action is a term used when a court determines that a statute or provision that creates a right also supports a remedy that can be achieved through a lawsuit, even though no remedy is explicitly provided for in the statute. An example of this is the Illinois Constitution that has deemed to be self-executing, but has not been held to create any new remedies[47]. If a state environmental right is deemed to be self-executing and creates a private right of action, then follow up questions include who can bring a lawsuit (private, government, etc), and against whom can the right be enforced (executive, legislature, private polluters, etc)[48]. The first issue involves standing. Illinois state code and a Hawaiian ruling suggests that the states environmental rights are only intended to enlarge standing.[49] The key issue of state environmental rights is whether the right stands alone as idealistic intent or is accompanies by a related provision that obligates the state to action. This point illustrates the importance of a well-defined right, complete only if enforcement mechanisms are articulated.

Carol Raffensperger points out that court watchers argue that the Supreme Court is constantly monitoring the decisions of state courts as a barometer for the will of the people[50]. This may suggest that amendments to state constitutions for environmental rights could filter up to the federal Supreme Court and influence environmental cases. This illustrates the experimental nature of state constitutions and how state outcomes can influence federal decisions.

Internation al E.R.

Many regional agreements in the global neighborhood have included provisions for environmental rights. The 1981 African Charter of the Human and Peoples' Rights stated in Article 24 that, "All peoples shall have the right to a general satisfactory environment favourable to their development". The 1969 American Convention on Human Rights in the Area of Economic, Social and Cultural Rights (Protocol of San Salvador) included an environmental provision in its 1989 Additional Protocol. It states that, "Everyone shall have the right to live in a healthy environment…". According to Tim Hayward countries like Brazil, Cape Verde, Costa Rica, Mongolia, Mozambique, Paraguay, the Philippines, Portugal, Spain, and Seychelles all have some form of constitutional environmental rights, though some refer to ecological equilibrium or balance[51]. Other international agreements that included environmental rights provisions include the Stockholm Declaration, Brundtland Report, Convention on the Rights of the

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[45] Payne v. Kassab, 361 A.2d 263, 272-273 (Pa. 1976)

[46] National Library for the Environmental Website – "Right to a Clean Environmental Provisions in State Constitution, and Arguments as to a Federal Counterpart", Robert Meltz, February 23, 1999 located at http://digital.library.unt.edu/govdocs/crs//data/1999/upl-meta-crs-1023/RS20084_1999Feb23.html?PHPSESSID=22dc576d84587e723917cf03ed855398#25 accessed on February 28, 2006

[47] City of Elgin v. County of Cook, 660 N.E.2d 875, 891 (I11.1995); Morford v. Lensey Corp., 442 N.E.2d 933, 937 (Ill. App. 1982)

[48] OpCit, National Library Website

[49] Fiedler v. Clark, 714 F.2d 77, 80 (9th Cir. 1983)

[50] Carolyn Raffensperger, "Constitutional Experiments: Protecting the Environment and Future Generations", Conservation Biology, Vol. 17, No. 6, December 2003, p.1488

[51] Hayward, Tim, *Constitutional Environmental Rights*, Oxford University Press, Great Britain, 2005, p.28

Child, Draft Declaration of Principles on Human Rights and the Environment, & Aarhus Convention.

What are the Difficulties with Environmental Rights?

There are various difficulties that impede the adoption of environmental rights. Enforcement, opposition by economic interests, determining 'safe' pollution levels, interaction with existing laws, and flexibility issues are some of the problems associated with the implementation of constitutional environmental rights.

enforcement

According to Betsy Apple, an integral component to assuring the enforcement of any right is that it be, "articulated with sufficient specificity to permit a tailored remedy"[52]. She points out that lack of clarity in the meaning, content and definition of environmental rights can lead to enforcement difficulties. A single definition of environmental rights can be interpreted in multiple ways, leading to different theories regarding responsibilities, accountability and outcomes. Apple cites how judicial confusion, economic pressures, and lack of binding international treaties with a consensus on the issue have contributed to enforcement problems with existing environmental rights[53]. Her line of thinking asserts that environmental rights would be more readily accepted and enforced if there were international treaties in place that guaranteed them as a human right. While some international treaties do define, recognize, and attempt to enforce environmental rights as a human right, Apple believes they are not sufficient. This is because existing customary international law lacks fixed parameters and is absent of a written code[54]. Apple maintains that it is because of this ambiguity that the courts consider it a risk to reference these treaties, unless they are enforcing the most well accepted violations of human rights (such as the right not to be tortured). It is also noteworthy to recognize that many international documents asserting environmental rights as a human right are not ratified or endorsed by the United States. Apple concludes that a sufficiently specific, universal, and obligatory international treaty accompanied by mainstream recognition of environmental rights would enable U.S. courts to succeed in enforcing environmental rights[55].

Sevine Ercmann summarizes the finding of three international meetings regarding the enforcement of environmental laws[56]. Enforcement of environmental laws is paramount to ensuring the enforcement of a constitutional environmental right. The International meetings Ercmann references were sponsored by the U.S. EPA, other relevant U.S. authorities, the Environmental Ministries of the host countries, and the Dutch ministry of Housing, Physical Planning and Environment. These conferences took place in Utrecht, Netherlands in 1990, Budapest, Hungary in 1992, and Oaxaca, Mexico in 1994. Ercmann outlines generalities, necessary means of enforcement, powers to be

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[52] Carnegie Council Website - Apple B, Commentary on 'The enforceability of environmental rights", located at http://www.carnegiecouncil.org/viewMedia.php/prmTemplateID/8/prmID/4464 accessed on February 22, 2006

[53] IBID, Apple

[54] IBID, Apple

[55] IBID, Apple

[56] Ercmann, Sevine, "Enforcement of Environmental Law in United States and European Law: Realities and Expectations", Environmental Law, Vol. 26, p. 1213-1239

given to authorities, the role of public awareness, the role of NGOs and other special interest groups, developing mechanisms of enforcement, and three principles going into the future. Ercmann's data are heavily cited because they represent a cooperative international effort to address a very specific problem. Multiple specific issues are addressed in his work, as well as innovative domestic and foreign methods used to tackle shared problems.

Ercmann points out general methods to ensure that environmental laws are properly interpreted and enforced. He begins by stating that national and international legal requirements regarding administrative, civil, and criminal provisions must be adopted. These legal requirements should begin with effective compliance measures and increased administrative control and participation. Ercmann believes that these measures will ultimately allow for better participation, information and judiciary control measures, which will yield effective enforcement. Before this can be accomplished, terms like 'enforcement' and 'compliance' need to be defined. The international environmental enforcement conferences defined compliance as follows:

> "Compliance is the full implementation of environmental requirements. Compliance occurs when requirements are met and desired changes are achieved….If requirements are well-designed, then compliance will achieve the desired environmental results. If the requirements are poorly designed, then achieving compliance and/or the desired outcome will likely be difficult…"[57]

Enforcement is defined as follows:

> "…Enforcement is the set of actions that government or others take to achieve compliance within the regulated community and to correct or halt situations that endanger the environment or public health."[58]

Traditional methods of enforcement include monitoring, inspection, reporting, gathering evidence to locate violations, and negotiating with individuals and industrial entities regarding methods of achieving compliance. The last step of compliance enforcement is the ability of enforcement agencies to pursue legal action or to dispute settlements[59]. Ercmann emphasizes that the success of an enforcement program depends on how the state exercises discretion when prioritizing environmental needs and objectives, and how it chooses the enforcement mechanism to achieve its objectives. Ercmann notes that effective enforcement may require reorganizing administrative structures, implementing environmental legislation, using innovative administrative instruments, drafting precise and comprehensive legally binding instruments, and making short-term economic sacrifices[60]. All these aspects of ensuring effective enforcement of environmental laws could increase the operating expense of government agencies. Changing administrative structures, drafting precise new laws, forgoing short-term economic benefits, and implementing new enforcement instruments all have associated costs. These costs should be seen as short-term investments for long-term environmental protection. Additionally, utilizing ineffective enforcement mechanisms, that are less expensive to implement, may

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[57] IBID, Ercmann p. 1215-1216
[58] IBID, Ercmann p. 1216
[59] Eric Hostetler, "Promoting the Effective Implementation of Multilateral Environmental Treaties: The Role of Non-Government Organization", *Strategies for Environmental Enforcement* p.279, 290-297, Stanford Environmental Law Society, ed 1995
[60] OpCit, Ercmann p.1216

yield less successful outcomes that also have associated costs. Cheap and ineffective solutions could result in larger environmental problems in the future that will be even more difficult and expensive to deal with.

Ercmann continues by identifying various means of enforcement. He begins by illustrating the codependent nature of enforcement and credibility in environmental law. Poor enforcement leads regulated entities to perceive the laws as being weak. A poorly constructed law, lacking legal credibility, leads to inefficient enforcement. This cyclical relationship between the comprehensiveness of a law (credibility) and enforcement outcomes is important to note when forming an environmental regulation. An effective environmental regulation should provide the necessary authority for enforcement. Legal provisions need to be stated clearly, precisely and practically, which requires broad statutory, regulatory and administrative authority[61]. Means of enforcement must be able to be pursued through administrative, civil (liability), and criminal measures, along with the improvement of judicial control. Ercmann identifies means of enforcement such as injunctions, legal action for reimbursement of costs, strict liability, voluntary compliance, inspection reporting, record keeping, monitoring through new technology, incentives, sanctions, negotiations, dispute settlements, etc. Negotiations can be carried out with entities that are out of compliance, but wish to comply. This allows for the development of tailored strategies to get a company into compliance, at a cost and timeframe that is acceptable to all parties. However, compromised environmental values or standards are risks that may result from negotiations[62]. Certain new technologies allow for automated and consistent monitoring of pollutant emissions, enabling regulatory agencies to accurately and comprehensively monitor the regulated. Incentives can reward desired behavior, while sanctions can punish unacceptable actions.

Authoritative agencies should have the power via administrative and criminal law to 1) seize property; 2) bar a facility from government loans, guarantees or contracts; 3) require service or community work to benefit the environment; 4) impose restrictions on financial assistance; 5) seek reimbursement for public authorities cleanup expenses; 6) impose fines with specified amounts per unit; and 7) seek imprisonment[63]. Ercmann maintains that enforcement authorities should have the responsibility of granting permits, authorizations, monitoring, reporting, emergency powers, and authorization of remedial action. They should have avenues of power through administrative, civil and criminal law. Criminal sanctions have a powerful deterrence effect, prompting many to comply to avoid criminal prosecution. To maximize this deterrence effect and to strengthen the public's perception of the law, detection of violations must be at a high rate[64]. This imposes a large expense. There must be either automated pollution discharge monitors in place (high short-term costs) or additional personnel in the field to travel and monitor the activity of the regulated (lower long-term costs). Once the detection of a violation has occurred, punishment should follow quickly. Ercmann's summary identifies some possible forms of administrative and criminal sanctions including1) denial or revocation

[61] IBID, Ercmann p.1217
[62] IBID, Ercmann p. 1218
[63] IBID, Ercmann p. 1218
[64] IBID, Ercmann p.1219

of permits, requiring the cessation of operations; 2) shutdown of operations; 3) adverse publicity; 4) economic sanctions; 5) fines; and 6) imprisonment[65].

Other issues regarding power of environmental enforcement authorities include how responsibilities for enforcement should be divided among various levels of government (local, state, federal). This is a question of vertical responsibility and power division. Two factors to be considered when distributing responsibilities include, the technical complexity of the problems to be regulated and the geographical areas most likely to be affected by negative environmental impacts[66]. Another consideration when dividing power of government should be which government authorities get delegated what responsibilities[67]. Should all environmental issues be under one bureaucracy, like the EPA or should they be shared with other specialty departments like the Department of Agriculture (pesticides) or Food and Drug Administration (contamination issues). This is a horizontal division of responsibilities and powers. Ercmann's data suggests that conflicts of interests between management and enforcement functions should be avoided in the same authority. Agencies must have the authority to force other public authorities to comply with environmental regulations, a difficult task. This is because there are remittance issues with fine payments, liability issues, and politics involved when trying to get one government agency to pay another.

Emerging environmental enforcement mechanisms that are complimentary to regulations have proved to be effective in increasing compliance outcomes, according to Ercmann. Increases in public awareness through community motivation, education, and incentives have served to enhance regulatory efforts, even when implementation yielded adverse economic impacts[68]. Nongovernmental organization (NGOs) and citizens have also played important roles in detecting violations and notifying authorities, applying public pressure, and bringing suits to enforce the law. NGOs have proved particularly effective in enforcing compliance through organizing and applying community pressure[69]. Specialized environmental training of officials, public prosecutors, and police have raised awareness, strengthened cooperative efforts, enhanced involvement, and increased violation detections[70]. Issues of extending standing to citizens, environmental organizations, and NGOs have also bolster compliance outcomes, according to Ercmann. An entity must prove that they have standing in a case in order to qualify it for judicial review. Citizen lawsuits can increase public awareness and motivate action by politicians. Allowing environmental organizations and NGOs standing in court, because of their high level of specialization and expertise, allows many cases to be brought that may not have otherwise had a chance to be heard. This is because individuals who suffer damages may not have the financial resources to back a case. Also, communities who suffer environmental harm may lack the organizational skills and funding to mount a convincing legal effort. Extending standing to environmental organizations and NGOs can help these individuals and communities pursue their right to legal redress.

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[65] IBID, Ercmann p.1219
[66] IBID, Ercmann p. 1221
[67] IBID, Ercmann p. 1220
[68] IBID, Ercmann p.1219
[69] IBID, Ercmann p.1220
[70] IBID, Ercmann p.1220

Requiring companies to retain staff environmental managers also enhances enforcement efforts[71]. These environmental managers should be highly trained and serve to advise the company as to their environmental performance. Ercmann identifies the duties of an environmental manager as 1) implementing legal regulations; 2) implementing measures and conditions of environmental media in order to protect the economic use of the involved media; 3) record keeping of environmental audits and inspections; 4) informing the public of shortcomings and suggesting remediation strategies to management; 5) proposing the use of suitable technology acquisitions; 6) developing and implementing measures to restrict, prevent or decrease waste production; and 7) educating the staff about the environmental measures to be used[72]. Careful consideration should be extended to prevent discrimination against environmental managers[73]. Since their decisions can affect a company's bottom line, they could face undue pressure, job insecurity, and poor treatment just by fulfilling their duties. If job security and fair treatment are not insured, these managers could compromise environmental outcomes to retain their employment status. Perhaps, environmental managers should be appointed by government agencies, with companies providing salary through escrow accounts. In this way, job security and environmental standards would remain high and discrimination would be discouraged.

Environmental auditing is another important complimentary tool to enforce environmental regulation that Ercmann considers[74]. Mandating independently reviewed auditing reports can serve to increase compliance outcomes. These audits should be required from all major polluters. Some European entities involved with the Eco-Management and Audit Schemes (EMAS) require that environmental auditing results be disclosed to the public. Existing environmental auditing in the United States has avoided such disclosures without company consent[75]. This is because there are criminal and civil liability issues associated with the adverse use of environmental audits. However, not enabling public disclosure may lead to company secrecy that undermines environmental interests and the public's right to know. A single accreditation system should be in place to train and license environmental auditors[76].

In his conclusion Ercmann outlines three further points to consider when trying to enforce environmental laws. First, there is the need to establish paths of implementation[77]. This attempts to correct the disconnect between the far reaching environmental objective set by congress and the lack of existing measures available to the EPA to reach those objectives. Ways of addressing this are by issuing binding measures that follow the aims of the objectives not yet attained and setting up judicial and administrative responsibilities[78]. The responsibilities of the judiciary and the administrative agencies must be detailed along every step of the implementation process, so no ambiguity exists. Second, there is a need for a systematic, integrated, and

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[71] IBID, Ercmann p.1226
[72] IBID, Ercmann p.1226
[73] IBID, Ercmann p. 1226
[74] IBID, Ercmann p.1230
[75] IBID, Ercmann p.1232
[76] IBID, Ercmann p.1232
[77] IBID, Ercmann p. 1238
[78] IBID, Ercmann p. 1238

comprehensive approach to environmental legislation[79]. This addresses the fact that amending the constitution for environmental rights is not enough on its own. Better, more thoughtful laws must be painstakingly constructed to guarantee that their spirit and objectives cannot be misinterpreted or undermined. Pollution standards, emissions control, chemical testing and other environmental regulations should not be constructed on a piecemeal basis. Laws should operate on an integrated basis to avoid confusion, regulatory omissions, and conflicts occurring from multiple fragmented regulations. All environmental standards and regulations should be harmonized (through reconstruction, amendment, or be subordinated to a trumping legal directive) so their objectives reflect the same environmental policy. Lastly, a balance must be struck between flexible legislation and precise environmental guidelines[80]. Detailed legislation leads to obsolete rules, while general legislation tends to be inaccurately interpreted. Legislation should include principles and guidelines that are directed by the precautionary principle, cooperation principle, substitution principle, principle of burden of proof, maintenance of biodiversity, non-degradation of natural resources, polluter pays principle, access to information, participation principle, and the principle of best available technology[81]. These principles should help orient lawmakers and the judiciary as to the aims of the environmental regulations.

Various issues about the enforcement of environmental rights pose unique difficulties. However, John Kincaid points out, "Whether or not such rights can be strictly enforced, they do serve a symbolic function in political society and can serve as guidelines for policymakers"[82]. To illustrate some enforcement difficulties consider the case of the right to clean water. How does a state or federal government enforce this right (fulfill government obligations)? How does a citizen know if they are being exposed to contaminated water (imperfect information problem)? Once contamination is recognized and proven, how is the source, assuming that no single point source can be found, of the contamination found (multiple sources contributing legal limits)? What is to prevent numerous citizens filing false claims because they perceive their right to clean water has been violated (fundamental issues with the creation of a new human right)? These are examples of some difficulties inherent with environmental policy enforcement. They are not impossible to solve, they are just less straightforward than typical litigations. If the law views the duties of government, under an environmental rights provision, as primarily of "the state to implement and enforce laws that secure to the individual the enjoyment of what is intended as the substance of the right", then the role of government enforcement seems more clear[83]. This simply leads to stricter interpretation and implementation of environmental rules and regulations. The judiciary, congress and the executive would be forced to take more precautionary measures to insure that the government was fulfilling its duty to protect citizen's environmental rights. However, government duties would have to expand to meet the needs of increased

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[79] IBID, Ercmann p. 1238
[80] IBID, Ercmann p. 1239
[81] IBID, Ercmann p. 1239
[82] Kincaid, John, "State Constitutions in the Federal System", Annals of the American Academy of Political and Social Science, Vol. 496, March 1988, p. 18
[83] Hayward, Tim, "Constitutional Environmental Rights: A Case for Political Analysis", Political Studies, 2000, Vol. 48, p.560

citizen participation, requests for access to information, and avenues of legal redress for environmental matters.

Imperfect info

There are many issues concerning imperfect information with respect to environmental problems. Some natural systems are imperfectly or incompletely understood by science, such as global warming. Some sources of pollution are hard to identify, especially when multiple sources are emitting levels below the legal limit. Additionally, the causes of some environmental problems are difficult or impossible to identify within the specific degree of accuracy needed to pursue legal action. In the face of these uncertainties, an environmental right would still require that the court protect citizens if environmental quality has fallen below the guaranteed threshold level. The courts will face considerable problems of knowledge when faced with certain environmental issues. Tim Hayward suggests that a solution to this problem could be to establish a specialty environmental court[84]. Establishing a specialty court would have the dual benefit of reducing the increased litigation burden that will undoubtedly arise once environmental rights are enacted. The United States legal system is already overburdened. A large influx of new environmental litigation could serve to cripple the system in its current framework. Establishing a new environmental court could result in a more effective way to address environmental litigation through a trained judiciary, expert panels, and a dedicated legal process.

Fulfilling all these additional governmental duties increases the operating expense of the federal and state government. Herein lies the biggest issue with respect to enforcement, the cost. The government will be required to provide new services, an increased volume of services will be requested, and the government will hold a greater degree of liability if they don't fulfill their obligations. For example, Dinah Shelton states that a state may become responsible for the actions of private actors if they fail to exercise proper due diligence to prevent or respond to violations[85]. This government liability is a result of the environmental right being classified as a basic human right. Human rights impose positive and negative duties on the government. If the government fails to perform some of it's positive duties, liabilities may result. Environmental rights may place the government in an uncomfortable position of having to simultaneously increase its expenditures and expose itself to additional liability. This dual increase in financial burden stemming from new administrative duties and liability exposure gives the government substantial reasoning to oppose environmental rights.

Economic opposition

The government is not the only sector of society that will have to bear the costs of an environmental right. Costs associated with shifting to more sustainable and environmentally friendly business practices cause many commercial and industrial actors to oppose environmental rights. There has been a longstanding belief by industry that strict environmental standards reduce competitiveness[86]. This belief is true to a certain extent, but is not a rule. There are short-term cost increases and necessary capital investments that will be required of many industrial and commercial entities with the adoption of an environmental right. Increased costs will be necessary to invest in new

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[84] IBID, Hayward p.564

[85] Shelton, Dinah, "Human Rights, Environmental Rights, and the Right to Environment", Stanford Journal of International Law, 1991-1992, Vol. 28, p.123

[86] M. Porter & C. van der Linde, "Green and Competitive", Harvard Business Review, September-October 1995, p.120

technology and processes to comply with stricter environmental regulations. These increased costs will no doubt reduce profits in the short term. Many corporations resist this because they are responsible to create quarterly profits for investors. Reduction in profits, even in the short term, could result in lower stock prices and decreased financial commitments from investors. Moreover, cost increases in production may have to be passed on to the consumer in the form of higher product prices. This reduces a company's competitiveness in the free market. This may not be a problem if all domestic industries are required to conform to the same standards. In this sense, everyone producing a product will be required to make the same adjustments (assuming their methods of production are similar), and incur similar cost. Products across the industry may see price increases, but competitiveness will not be affected since the rules will be the same for everyone. Players in the market who had environmental foresight will realize a comparative advantage. Those who invested early in strict environmentally friendly technologies will be able to offer their products at lower prices than their competitors.

In the face of globalization, the scenario becomes much different. Foreign companies who operate in countries that have loose, little, or no environmental regulations will have a severe comparative advantage over strictly regulated domestic companies. Countries like China, India, or other developing nations will be able to produce products at much lower prices then companies that operate in the United States. In this sense, environmental regulation will negatively impact a company's competitiveness in the market. A fundamental rule of economics must be understood to comprehend this problem. The negative impacts of environmental pollution and degradation are not quantified and included in the price of the resulting product. These unaccounted for outcomes are called negative externalities. An example of negative externalities is the pricing of cigarettes. The price a person pays for a box of cigarettes does not include the costs associated with the increased health risks (negative externality) of consuming that product. If they did the price would be much higher to reflect the costs associated with a shorter life span, medical care expenses, pain and suffering of the sick individual and their family, negative health impact to others from second hand smoke, etc.

Historically, companies have not internalized the negative externalities resulting from profit driven operations. As a result of these omissions, the prices of the products offered by these companies have been artificially low. Instituting strict environmental regulations forces companies to invest in reducing the negative externalities that result from their operations. Strict environmental regulations do not completely account for all of the negative externalities, but they are an important step in that direction. Investments made to comply with regulations lead to reduced profits or higher priced products for consumers. Since companies operating in foreign markets are not subject to stricter environmental regulations, they are not forced to internalize the negative environmental externalities created by producing their products. This enables them to offer products at lower prices, hence enhancing their competitiveness. Domestic companies will have difficulty competing with foreign companies if they have to abide by stricter environmental standards. However, this is not a reason to abandon strict environmental regulation. Tools to create 'market failures' can help to keep domestic companies competitive and push foreign companies to enhance their environmental protection.

International instruments like ISO 14000 environmental standards and tariff-based trade barriers serve as incentives and disincentives for international companies to comply with mandatory domestic environmental standards. However, there are several international organizations and treaties that the ban the use of such barriers to free trade, like the World Trade Organization and the General Agreement on Tariffs and Trade. These instruments and the conflict between free trade and environmental protection are discussed later in this chapter. Forcing internationally based companies to comply with strict domestic environmental regulations, resulting from environmental rights, could yield positive multiplier effects. These multiplier effects are realized as foreign companies shift their native practices to conform to United States standards. This could lead to foreign countries enacting stricter environmental standards in their own territories, resulting in better environmental outcomes all over the world.. The economic incentives to continue doing business in the United States could be reason enough to institute better environmental practice abroad.

Another fear of industry is that investing in new environmental technologies before they are established could be risky. Investments into new capital, like technology to reduce emissions, are purchased and the costs are amortized over the useful life of the piece of equipment. This allows the initial cost to be spread out over time, thus reducing the impact on quarterly and yearly profits. However, if a unit of technology is bought with a twenty-year useful life, only to be replaced in ten years with a superior technology mandated by the government, the company incurs significant losses. This is a very real problem faced by many industries. The reality of this problem does not have to prevent companies from shifting to more environmentally friendly solutions. The government can take many steps to encourage new technology purchases and insure that investments made in good faith to protect the environmental will not be penalized by future regulations. This can be done by tying new technology expenditures to company's 20-year capital reinvestment cycles. Therefore, if a company makes a sound investment into a government accepted technology, it should be allowed to use that technology. If new government regulations mandate stricter technologies ('best available technology'), the company should be required to switch only at the end of the twenty-year life cycle of the existing unit. Tax credits could also be offered by the government to subsidize the purchasing of new environmentally friendly technologies. This could help make new investments look more attractive and offset short-term costs. Companies must also consider the long-term savings and earning potential associated with regulation compliance through better technology, cost savings with more energy efficient equipment, and comparative advantage to be gained by an improved environmental image in the mind of consumers.

Consumers will also feel the financial burden associated with the inception of environmental rights. Consumers could experience higher prices for all products, as businesses will be forced to pass some of the increased production and operating costs onto the consumers. The government will also rely on citizens to help finance the extra responsibilities they will incur from the inception and enforcement of an environmental right. This burden will come in the form of higher taxes on citizens. No one in the American economy will be insulated from costs associated with implementing environmental rights. Many foreign markets stand to be impacted from this U.S. right also. To reiterate, these costs should be viewed as short-term expenses to solve a long-

standing problem. This major market correction will happen once, at the time the environmental right is put into action. Transitionary costs will subside as government mechanisms are established, business practices change, and consumer consumption adjusts. Costs to the government will stabilize after an initial inundation. Businesses will eventually realize sustainable practices that will allow them to offer comparable performance and lower pricing to their products. Consumers will adjust their spending habits in the short-term and enjoy lower prices again in the future. A phase-in period can be used to soften the financial blow that will occur as environmental rights are established. This phase in period can consist of, say a five-year period, when the environmental right is gradually put into effect. This will allow individuals and entities to gradually change their behavior, investments, spending, processes, etc. This phase-in could prevent many businesses from going bankrupt, by allowing needed expenditures to be obtained in an incremental manner without fear of being out of compliance. The phase-in period would also be a major incentive for businesses to make investments into innovative technologies and processes that previously looked too risky in the absence of a commitment by the government to environmental sustainability. A phase-in would also allow the government to prepare administrative and enforcement mechanisms in a manner conducive to thoughtfulness and accuracy, not brevity and haste. Consumers could also prepare by planning consumption shifts, educating themselves about the environment and the economic changes that will arise from environmental rights, learning about their new found rights, finding replacement products, and saving money in the bank. A phase-in period of the constitutional environmental right will enable the economy to adjust to necessary changes as painlessly as possible.

Pollution standards

The development of an environmental right would require old pollution standards to be reviewed and new pollution standards to be set. An environmental right should guarantee that pollution standards would be set using the precautionary principle. The precautionary principle states that if the consequences of an action are unknown, but judged to have the potential for significantly negative or irreversible consequences, it is better to avoid that action. Two main themes of the precautionary principle are to prevent and anticipate harm. Acceptable levels of pollution are extremely hard to determine because people have different sensitivities to pollution. Children and the elderly are more sensitive to pollution than adults. Additionally, people with underlying respiratory, heart, or health problems are also more susceptible to pollution related illnesses. Pollution standards should use health risks to a child as their threshold point. Additionally, the compound effects of multiple sources outputting acceptable levels of pollution should be considered. So that while one source may release the minimum allowable pollutants determined to be acceptable risk for a child's health, regulators must consider what the effects of multiple sources in an area will be.

Some realities of modern civilization dictate that certain risks be taken. For example, the use of plastics in the United States is common, pervasive, and arguably beneficial. Some natural plastics can be made through innocuous processes, such as mixing cream and vinegar while manipulating them with various temperature settings. Synthetic and petroleum-based plastics have more significant environmental impacts such as harmful emissions releases and difficulties with the end stage of their life-cycle (because they do not biodegrade). Harmful results from plastic production are; increased levels of carbon dioxide (a greenhouse gas), volatile solvent and monomer releases

(proven to be carcinogenic and affect reproduction), and harmful plasticizers leaching[87]. While plastic production does pose negative environmental impacts, the use of plastic does have many benefits. Plastic can be substituted for wood, metal and other heavy material, thus reducing transportation costs and emissions, as well as sparing other natural resources. When formulating acceptable pollutant levels it is important to be mindful of the trade-offs involved and the environmental impacts resulting. Setting pollutant levels with the precautionary principles in mind will impose strict limitations on material producers. This may cause them to develop less harmful alternatives or it could drive them out of business. Here again, a phase-in period of the new standards can help business cope with increased financial burdens and shifting business practices.

The setting of pollution standards must be undertaken with equal inputs from health scientists, industrial representatives, and independent technology scientists so that reasonable, but strict, standards can be set. Although this process will take longer, it will enable the end result of finding the right mix of health risk, industrial compromise, and technological innovation. Trade-offs of the consumer must also be considered as some product will undoubtedly be banned and substitutes will have to be considered. The public trust doctrine can help guide regulators as they weight the preferences of current consumers with the impacts on future generations. It should also be kept in mind that short-term sacrifices of today's consumers can be offset by long-term increases in societal welfare. This is illustrated by the fact that in our free-market economy, any products or processes that are eliminated through strict standard setting will ultimately lead to opportunity in the market. Those who can devise products and processes that meet consumer needs while complying with the new government standards stand to earn price premiums. In this sense, stricter government standards work as incentives for innovation. There might be a lag between the time new standards are imposed and substitutes and replacements are realized. However, this should be seen as short-term economic and consumer sacrifice, which could be offset by the gradual phase-in of the new standards.

Property rights

Many existing laws could conflict with a newly imposed environmental right. The Fifth Amendment to the Bill of Rights maintains that no person will be deprived of life, liberty or property, without due process of law, nor shall private property be taken for public use without just compensation. However, what if a person's private property is deemed to be integral to the environmental health of the nation? This is the case in Midland, Detroit near Mt. Clemens where property rights of developer-owned wetlands are being debated. The U.S. Supreme Court, began hearing this case on February 21st, 2006, and are faced with arguments from landowners and environmentalists as to the fate of over a million acres of wetlands in Detroit. Landowners maintain that regulators should not pose restrictions on the use of the land because it would rob the property of value. Specific to this case, land-owners argue that the Clean Water Act's wetland protection mandate only extends to crucial wetlands that connect directly to waterways. Environmentalists believe that these wetlands serve as to purify polluted waters before entering major waterways, protect the inland areas from floods and intense storms, and provide ecosystems for many species. Environmentalists cite the Clean Water Act of

[87] Environmentally Conscious Manufacturing Strategic Initiative Group Website – "Plastics: Impacts, Risks, and Regulations" located at http://ecm.ncms.org/ERI/new/IRRplastics.htm accessed on February 15, 2006

1972, which was intended to protect wetlands connecting to rivers and lakes. Landowners cite their 5th Amendment rights to private property.

Some property owners, like Keith Carabell, don't mind if the government wants to protect this land. However, he expects to be compensated for the value of the property as per his 5th Amendment right[88]. Other property owners, like Joe Rapanos, are less likely to acquiesce. Rapanos has served prison time, paid fines, and is on probation for illegally filling wetlands. Rapanos has also paid for billboard signs accusing government regulators of being Nazi's, plead 'no contest' to charges of making obscene phone calls, and plea-bargaining after and initial charge of extortion in a property zoning case[89]. Environmentalists argue that the case in Detroit has national implications. More than half of the nation's wetlands have been destroyed for farming or development and more than half of the remaining 100 million acres could lose federal protection with a pro-developer ruling in the Rapanos case[90]. The government maintains that it has the authority to protect the isolated Detroit wetlands, drainage ditches, and small streams under the Clean Water Act because they impact the well being of larger lakes and rivers. The central debate that must be decided by the Supreme Court is whether these wetlands are linked closely enough with larger bodies of water.

The property rights scenario detailed above illustrates the difficulties that arise when the environment is pitted against economic interests. If there was a constitutional environmental right in the United States, how would it impact the Rapanos decision? This would depend on the definition of the right and the science backing the claims of environmentalists. Let's use the Brundtland Report definition of, 'All human beings have the fundamental right to an environment adequate for their health and well-being'. If the wetlands were scientifically proven to protect the health and well being of humans, then perhaps their protection could be upheld. This benefit to human health and well-being could be illustrated by proving the wetlands filter out harmful water pollution, but probably more convincing would be the protection (health and economic) the wetlands provide to inland areas in the face of intense storms and flooding. The protective natural of wetlands from marine based storms is echoed in the wake of 2005's Hurricane Katrina. A BBC report entitled, "Katrina Damage Blamed on Wetlands Loss", detailed the many ways that wetlands serve to protect the coastal area of Louisiana and Mississippi[91]. The article also illustrated how years of development and degradation of the wetlands enabled storm surges to become 20% higher and 2 to 3 times faster than it would have been if the swampland were intact[92]. If the case was ruled in favor of the environmentalists, the government would be responsible to pay the developers the market (or purchase price) value of the land. This compensation would enable the landowners 5th Amendment right to be upheld.

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[88] The Detroit Free Press Website – "Case pits your property rights vs. environment", Hugh McDiarmid, Jr., February 17, 2006 located at http://www.freep.com/apps/pbcs.dll/article?AID=/20060217/NEWS06/602170447/-1/BUSINESS07 accessed on February 21, 2006

[89] IBID, Detroit Free Press

[90] IBID, Detroit Free Press

[91] BBC News Website – "Katrina Damage Blamed on Wetlands Loss", Tim Hirsch, November 1, 2005, located at http://news.bbc.co.uk/2/hi/americas/4393852.stm accessed on March 1, 2006

[92] IBID, BBC News

Free trade

Another example of environmental rights conflicting with existing laws is the relationship between free trade and environmental protection. The Uruguay Round of the General Agreement on Tariffs and Trade (GATT) and the inception of the World Trade Organization (WTO) have set up rules to ensure free trade is protect. Free trade is the unobstructed flow of goods and services between countries. Ensuring free trade means the abolition of tariffs, barriers to trade, taxes, subsidies, and laws or regulations that give domestic firms an advantage over foreign firms. Free trade is supposed to provide consumers with a higher economic standard of living, access to higher quality products, lower product prices, as well as labor opportunities. Benefits are to be received by developing and developed countries. However, free trade has many pitfalls. Environmentalists argue that free trade allows for increased environmental degradation, failure of policy makers to adequately protect the environment, shifts pollution-intensive productions to other countries instead of curtailing them, can result in lower environmental standards in foreign countries as well as at home, and that the WTO has served to perpetuate the environmental problem. Environmentalists argue that environmental protection is being forfeited for the purpose of short-term economic improvement. They also believe that environmental protection should be pursued in all countries, because pollution has transboundary effects. So pollution in other parts of the world can affect the environmental scenario domestically. Advocates of free trade believe that lower environmental standards in foreign countries help those countries achieve a competitive advantage. This advantage enables them to increase market share and improve their domestic economic situation. Free trade economists argue that environmental standards will be raised in foreign countries when the marginal benefits of protection equal their marginal costs. They believe increased environmental protection will occur slowly as the countries develop and attain a certain standard of living. Only when primary concerns like food, water, health, etc are achieved will ancillary concerns like the environment be given attention. In essence, free trade advocates believe that environmental protection in foreign countries will result over the long-term if free trade is guaranteed.

Developing countries believe that environmental regulations imposed by developed countries are discriminatory in nature and not based on true environmental concerns[93]. Their rational is as follows: developing countries seem more concerned about the environment, but they are not because they consume more energy, produce more pollution, are unwilling to reduce energy consumption, export goods that are domestically prohibited on environmental grounds, and are reluctant to share technology and financial assistance in reaching international environmental aims. It is important to understand the different perspectives that developing and developed countries view environmental protection and environmental rights from. Developing countries are unwilling to sacrifice food, water, good health, disease prevention, shelter, clothing and the basic necessities of life for incremental improvements in the environment. They tend to value short-term economic improvements over long-term sustainability. Only drastic incidents of extreme environmental degradation, like the contamination of drinking water by a multinational corporation that leads to negative health outcomes, are priorities to

[93] Law Bridge Website – "Conflict Between Free Trade and Environment Protection – where we go and what we do tomorrow", B. Xu, C. Yang et al located at http://www.law-bridge.net/english/LAW/20055/1322270722504.html accessed on February 24, 2006

developing countries. On the other hand, developed countries are unwilling to sacrifice the high standard of living they have grown accustom to for incremental improvements in environmental quality. While 'quality of life' issues like environmental protection tend to be more in the public's awareness in developed countries, there seems to be more knowledge than action. There is a reluctance to change lifestyles habits in developed countries, and a desire to achieve a certain lifestyle in developing countries.

Free trade is seen by many to enhance the lifestyles of developed countries and help achieve a lifestyle standard in others. However, some argue that the organizations and documents that allow for free trade have done so at the expense of the environment. The WTO has shown numerous times that it is an organization tasked with letting trade flow freely, not environmental protection. Though the WTO has environmental protection clauses and GATTs Article XX allows for environmental protection over free trade concerns, in practice the environment has proven to be subordinate to economic considerations of free trade. Examples of this can be gleaned from decisions of the GATT/WTO dispute resolution panel regarding the Tuna-Dolphin case[94], Reformulated Gasoline[95], and the Shrimp-Turtle case[96]. However, according to B. Xu and C. Yang there are various methods of allowing for free trade to exist while ensuring environmental protection. They suggest exempting multilateral environmental agreement in GATT through a waiver, amending the GATT to exempt environmental protection actions, procedural changes to dispute settlements under the GATT/WTO, changing the dispute settlement forum from the WTO to a less biased but equally powerful international organization, and instituting standardized methods of eco-labeling on appropriate products[97]. In light of these suggestions it seems clear that a conflict between environmental protection aims and free trade does exist, but that they do not pose unanswerable questions.

If environmental rights were to be adopted in the United States, many other countries would be impacted. Binding international instruments like the GATT and WTO would have to be amended to reflect the increased commitment to environmental protection echoed by the United States. If such a commitment was recognized and respected by the developing countries of the world, perhaps they would support these changes as true attempts to protect the environment and not acts of discrimination. In order to assure developing countries that the Untied States is committed to environmental protection, we will have to address their criticisms of our actions. This includes reducing energy consumption and pollution, sharing technology, and applying domestic environmental rules to dealing with foreign countries.

Another example of a law that would conflict with a federally guaranteed environmental right is the Commerce Clause. The Commerce Clause is articulated in Article 1, Section 8, Clause 3 of the United States Constitution. It gives congress the power to regulate commerce with foreign nations, between states and with the Indian tribes. A constitutional environmental right could interact with the Commerce Clause in

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[94] United States--Restrictions on Imports of Tuna, Aug 16, 1991 30 I.L.M. 1598 (1992)
[95] United States--Standard for Reformulated and Conventional Gasoline, Jan 29, 1996, 35 I.L.M 603 (1996)
[96] United States--Import Prohibition of Certain Shrimp and Shrimp Products 37 I.LM 832 (1998) & United States--Import Prohibition of Certain Shrimp and Shrimp Products 38 I.L.M 118 (1998)
[97] Law Bridge Website – "Conflict Between Free Trade and Environment Protection – where we go and what we do tomorrow", B. Xu, C. Yang et al located at http://www.law-bridge.net/english/LAW/20055/1322270722504.html accessed on February 24, 2006

different ways[98]. Currently, some argue that environmental regulations enacted by states undermine federal constitutional powers, like the Commerce Clause. Examples of this would be when a state statute to protect natural resources for citizen use was struck down because it involved some form of "economic protectionism"[99]. When environmental concerns are the aim of state statues, not economic protectionism, they have been more successful even though they place burdens on commerce[100]. Others believe that the Commerce Clause prevents the states from experimenting with new regulations, like environmental rights. State courts have used the interstate commerce clause to try and support federal environmental legislation[101]. Yet some federal environmental legislation has been challenged on the ground that congress exceeded its powers under the commerce clause in enacting it[102]. In fact, the myriad of arguments for and against the Commerce Clause on environmental grounds is staggering. It can be construed in many different ways, but usually to the benefit of economic interests. The commerce clause is yet another example of how an environmental right granted by the U.S. Constitution could conflict with existing regulations.

It has been suggested that a constitutional environmental right could have extremely negative national implications in the future, in terms of lack of flexibility[103]. If the United States enacted an environmental right, and later needed to perform an action contrary to this right in the interest of national security or on behalf of an equally desirable social good, a constitutional issue may arise. This lack of flexibility could back the United States into a corner, preventing it from acting on behalf of society's true needs. Although this would not be the intent of a constitutional environmental right, it could be a real result. For this reason, a 'temporary escape' provision should be included in the wording of the constitutional amendment[104]. This provision should be flexible enough to allow for emergency measures, but not too flexible to allow for hijacking of the right by political will or short-term economic interest.

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[98] National Library for the Environmental Website – "Right to a Clean Environmental Provisions in State Constitution, and Arguments as to a Federal Counterpart", Robert Meltz, February 23, 1999 located at http://digital.library.unt.edu/govdocs/crs//data/1999/upl-meta-crs-1023/RS20084_1999Feb23.html?PHPSESSID=22dc576d84587e723917cf03ed855398#25 accessed on February 28, 2006

[99] Pennsylvania v. West Virginia, 262 U.S. 553 (1923)

[100] Guschke v Oklahoma City, 763 F.2d 379, 384 (10th Cir. 1985)

[101] National Association of Home Builders V. Babbitt, 130 F.3d 1041 (D.C. Cir. 1997) (regulation of purely intrastate species under Endangered Species Act satisfies Commerce Clause by preventing destruction of biodiversity on which certain interstate commerce depends), *cert. denied*, 118 5. Ct. 2340 (1998)

[102] Hodel v. Virginia Mining and Reclamation Association, 452 U.S. 264 (1981); McCoy-Elkhorn Coal Corp. v. EPA, 622 F.2d 260 (6th Cir. 1980)

[103] National Library for the Environmental Website – "Right to a Clean Environmental Provisions in State Constitution, and Arguments as to a Federal Counterpart", Robert Meltz, February 23, 1999 located at http://digital.library.unt.edu/govdocs/crs//data/1999/upl-meta-crs-1023/RS20084_1999Feb23.html?PHPSESSID=22dc576d84587e723917cf03ed855398#25 accessed on February 28, 2006

[104] IBID, National Library Website

Conclusion

A weak anthropocentric constitutional environmental right worded as, "All human beings have the fundamental right to an environment adequate for their health and well-being", could have the benefit of protecting humans as a priority while still considering the nature for its own sake. The need for such a right as a *fundamental* human right is recognized and established by international organizations and treaties. These entities acknowledge that a healthful environment is a prerequisite to being able to enjoy more traditional and established human rights. Within the United States several state constitutions have also reflected the public's desire for environmental rights and protection.

While the idea of environmental rights seems appealing, the drafting, implementation, and enforcement of such a right is pragmatically unattractive. To ensure the feasibility and enforceability of such a right it will have to be drafted with considerable attention to detail. The precautionary principle and doctrine of public trust can guide lawmakers in formulating an amendment that would be interpreted and enforced in the spirit as well as the definition that the law intended. A properly conceived amendment would address implementation and enforcement pathways to achieving goals, self-executing provisions, procedural and substantive rights, necessary reforms, duties of the government, legal rights of citizens and immigrants, mechanisms to solve conflicts with existing laws, flexibility provisions, methods of seeking redress, guarantees set up by the right, and relationship of the federal right to existing state and federal environmental protection legislation and regulation.

The considerable difficulties that exist with creating a workable environmental right should not prevent the undertaking. Aside from the legal and administrative planning that must go into the development of such a right, significant costs will also be required. The government and industry might oppose environmental rights because of the cost impact. By the same token, citizens may oppose environmental rights because of higher product prices and the inevitable tax increase that would occur to finance its implementation. What should be kept in perspective is that the environmental affects everyone, in all areas of the world, in all sectors of the economy, for as long as the human race exists. Preserving the environment for the benefit of the health and well being of the human race requires sacrifices to be made by all who enjoy the services the environment provides. Government, industry and consumers will all have to share the cost of adopting and implementing constitutional environmental rights. Formulating a plan to Phase in this right will help all parties absorb the associated increased costs over time, with minimal discomfort.

The costs incurred to institute and enforce environmental rights should be viewed as market corrections for years of under-valuation of the benefits of environmental goods, services, inputs, and outcomes. The economic prosperity that America has experienced since it's establishment has largely been at the expense of environmental prosperity, well-being, and abundance. It is as if America used a credit card, backed by the environmental, to finance its development. Timber was cut, land, air and water were polluted, species decimated, natural features destroyed, natural resources plundered, all for benefit of Americans. Now that America has developed and stabilized that credit card debt should be repaid. Large accrued interest has mounted on this debt, in the form of

pollution, degradation and public policy, business practices and consumer consumption patterns that underestimate the value of environmental inputs. The enormous cost of paying back the debt may be preventing the government from acting, causing industry to resist and making consumers intimidated or complacent. Postponing action further will not solve the problem, it will only increase the intensity of the environmental debt as well as increase the likelihood of negative environmental outcomes. Enacting a constitutional environmental right seems like an enormous undertaking, because it is. It has to be because the breadth of the environment, severity and history of environmental abuse and under-valuation, and the life-sustaining and health determining role of the environment dictate that it be so monumental. The importance of environmental protection for current and future generations argues that the daunting task of creating a viable solution should not deter it from being developed.

An American Evolution – Public Health Chapter

Christina Simeone

Introduction

Public health is concerned with the overall health of a community. In the United States the Public Health Service, Department of Health and Human Services, the Centers for Disease Control and Prevention (CDC) and the Agency for Toxic Substances and Disease Registry are concerned with public health and preventative measures. State health departments coordinate with county and city health departments that focus on general issues related to their respective populations. Public health expenditures are based on health economics, which attempt to allocate limited resources to areas that will save the most lives or result in the greatest increases in quality of life.

Environmental pollution, caused by human related activity, poses a considerable concern to public health. This chapter first examines various stressors in the environment that affect human health. The second part of this chapter identifies diseases that result wholly or in part from human induced environmental pollution. A brief discussion follows about the estimated costs of such diseases and the regulatory fragmentation surrounding chemical regulations that possibly inhibit effective public health protection.

Amending the U.S. Constitution with an environmental rights provision would affect how the government, industry, and the public perceive environmentally related public health issues. Environmental rights would effectively enhance the health of the public by 1) forcing the government to adopt stricter pollution standards resulting from their increase liability exposure; 2) enact comprehensive environmental regulations to curtail regulatory fragmentation; 3) give citizens, environmental organizations and the EPA more power to stop the actions of entities who pose greater risks to human health; 4) deter future environmentally irresponsible behavior by setting up hefty fines and sanctions for violators and pathways to legal redress for those whose rights have been violated; and 5) encouraging stricter product testing to protect environmentally-related consumer health. An environmental right could realize many positive indirect effects on public health as well. These include environmentally corrective cost-benefit analysis methods resulting in fewer government projects and programs that negatively impact the natural environmental and human health. Negative effects could result from environmental rights if the associated cost increases are not managed correctly. For example, if the government attempts to pay for increased operating costs resulting from environmental rights by shifting money away from healthcare expenditures, unintended negative public health impacts could result. An environmental right should be seen, as a tool to augment public health by insuring an environment adequate for a person's health and well-being.

Part 1 - Environmental Health Stressors

Environmental health is a term used to relate how the condition of the environment affects human health. There are many types of stressors in the environment that can negatively affect human health and cause disease in humans. There are also

many different ways to be exposed to such environmental stressors. Mainly, there are workplace or occupational environmental hazards, extreme environmental conditions, or anthropogenic environmental pollution.

Workplace exposure may occur in a one time, heavy dose resulting from a catastrophic event, or may happen more subtly with slight exposure over long periods of time. Government organizations like the Occupational Safety and Health Administration (OSHA) have imposed operating guidelines, regulations, and penalties on employers to standardize workplace conditions and protect employees that work in potentially hazardous industries. While these workplace issues are serious causes of environmental health issues, they will not be the focus of this chapter. Diseases caused by extreme environmental events like heatstroke from high temperatures, hypothermia from extreme cold, mortality from living in a flood plain, etc. are also not the focus of this chapter. The first section of this chapter will focus on sentinel, 'anthropogenic' environmental health stressors that can cause disease in humans. This chapter will focus on environmental health stressors in the United States.

Many environmental stressors that have been scientifically and directly linked to human diseases will be examined. Establishing a scientific link between pollutants and negative health impacts is a particularly hard task. This is because exposure often happens in small doses over long periods of time, and the time from exposure to manifestation of disease (latency period) can take equally as long. Therefore, establishing an empirical cause and effect relationship has proven to be difficult. The stressors that will be focused on in the first section of this chapter will be; 1) outdoor air pollutants including ground level ozone, particulate matter, and carbon monoxide, 2) indoor air pollutants including asbestos and lead-based paint, 3) heavy metal poisoning, and 4) pesticide poisoning.

Air Pollution Stressors

Air is composed of 99.9% nitrogen, oxygen, water vapor and inert gases. Air pollution is one of the most proven causes of environmental health diseases. Air pollution can come in the form of criteria pollutants and hazardous or toxic substances in the ambient air. Such substances are ground level ozone, particulate matter, carbon monoxide, chemical emissions, and other air toxics. Each type of pollutant has its own set of health hazards, which will be examined. Air pollution is a serious public health problem because an enormous number of people are exposed over their entire respective lifetimes[1].

Ozone present in the stratosphere (upper atmosphere- 10 to 30 miles up) offers humans the benefit of a natural protective layer against ultraviolet radiation coming from the sun. There are many scientific worries about the deterioration this beneficial ozone layer has experienced. Of specific concern is the large hole in the layer that has appeared over the Antarctic. Ozone in the troposphere (lower atmosphere) is called ground-level ozone and it is very harmful to human health. Ground level ozone is a result of human made processes that produce volatile organic compounds and oxides of nitrogen, which form highly reactive oxygen (O_3) gas when mixed with sunlight. Motor vehicle exhaust, industrial emissions, gasoline vapors, chemical solvents, and natural sources emit oxides

[1] American Heart Association Website – Air Pollution, Heart Disease and Stroke, located at http://www.americanheart.org/presenter.jhtml?identifier=4419 accessed on March 2, 2006

of nitrogen and volatile organic compounds. Ground level ozone is usually a major concern in summer months because the combination of hot weather and increased sunlight cause concentrations of ozone to become very harmful. The most harmful peak ground level ozone concentrations usually occur in dry, hot, stagnant summertime conditions. Some warmer areas of the South and Southwestern United States can have harmful ozone conditions almost the entire year[2]. Urban areas where motor vehicle use is clustered and industrial processes are present, are particular hotspots for ground level ozone production. Rural areas can also be subject to ground level ozone as it can move through the force of winds for hundreds of miles. Ground level ozone is also a major component of smog.

When inhaled by a human, the ground level ozone gas oxidizes any internal body tissue it comes in contact with. Ground level ozone comes into most direct contact with lung tissue. Ground level ozone is a powerful respiratory irritant at concentrations usually found in urban areas during warm weather or summer seasons. Short-term ground level ozone exposure often leads to shortness of breath, chest pain when inhaling deeply, wheezing and coughing, headaches, nausea, and throat and lung irritation[3]. The long-term effects of moderate ground level ozone exposure may cause permanent changes in lung structure, leading to premature aging of the lungs and worsening any chronic lung disease[4]. The most sensitive groups to ground level ozone pollution are children whose lungs are still developing, people who do strenuous outdoor exercise, the elderly, and those with respiratory illnesses like asthma, bronchitis, pneumonia, emphysema, or colds. Damage to lung tissue may be caused by repeated exposures to ground level ozone. Something akin to repeated sunburns of the lungs, which could result in a reduced quality of life as people age[5]. In addition, ground level ozone has been shown to cause harm to vegetation and ecosystems, resulting in reduced agricultural crops, reduced commercial forest yields, shorter growth and survival of tree seedlings, and increased susceptibility to disease, pests, and environmental stress in plants[6].

Ground level ozone has been associated with an increased rate of hospital admissions and exacerbation of respiratory illnesses[7]. One recent study that examined 95 urban areas over a 14-year period has linked short-term ground level ozone exposure to premature deaths[8]. Most of these deaths occurred in the elderly or those with previous heart or lung illnesses. The ground level ozone seems to cause inflammation, which leads to premature death. The daily national average for ground level ozone is around 40 parts per billion, though this number can be dramatically higher in summer months. The study showed that when ground level ozone rose by 10 parts per billion during a given week, people were about 0.52% more likely to die. This corresponds to a 3,767 additional deaths per year for the 95 urban communities. In addition, the 10 ppb increase

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[2] EPA website - http://www.epa.gov/air/urbanair/ozone/chf.html
[3] Committee of the Environmental and Occupational Health Assembly of the American Thoracic Society. Health effects of outdoor air pollution: part 2. Am J Respir Crit Care Med. 1996;153:477-498
[4] EPA website - Air Trends of 6 principle pollutants located at http://www.epa.gov/airtrends/ozone.html
[5] EPA Website - http://www.epa.gov/ttn/oarpg/naaqsfin/o3health.html
[6] EPA website - Air Trends of 6 principle pollutants located at http://www.epa.gov/airtrends/ozone.html
[7] Dockery DW, Pope CA III. Acute respiratory effects of particulate air pollution. Annu Rev Public Health. 1994;15:107-132.
[8] Michelle L. Bell, et al. 'Ozone and Short-term Mortality in 95 US Urban Communities, 1987-2000' JAMA Vol. 292 No. 19, November 17, 2004. p. 2372-2378

in ground level ozone led to a 0.64% increase in cardiovascular and respiratory mortality[9]. A 15 ppb increase in the ground level ozone concentration caused a 0.64% increased mortality risk, while a 20 ppb increase caused a 0.67% increased mortality risk[10]. These increased percentages may seem small, but in large populations the corresponding number of affected humans can be significant.

Numerous studies around the world have also linked ground level ozone with increased mortality risk. Differences in study designs yield unique but similar interpretations and outcomes. Different design methods like distributed-lag models, hierarchical models, time-series, or meta-analysis, have all yielded a positive correlation between ozone concentration and increased mortality risk. Other factors that could affect results are considering and adjusting for weather, humidity, temperature dependency, effects of other pollutants (particulate matter), and lag time from exposure. A study by Anderson et al for the World Health Organization that showed a 10ppb increase in daily ground level ozone accounted for a 1.003% increase in mortality using data from several European Cities[11]. A weather adjusted study by Thurston and Ito showed a 1.56% increase in daily mortality with a 100 ppb increase in the ground level ozone daily one hour maximum[12].

In 1997 the EPA proposed revisions to the National Ambient Air Quality Standard (NAAQS) for ground level ozone. This was done in response to epidemiologic and toxicological studies that showed negative human health impacts at ground level ozone concentrations under the then current 120ppb daily hourly maximum. The new regulation added a daily 8-hour maximum standard of 80 ppb. Currently, more than a hundred municipalities in the United States are not in compliance with the 8-hour NAAQS for ozone, with the most extreme violations in California[13].

Particulate Matter is the name given to the mixture of solid particles and liquid droplets found in the air. These particles differ in size from the larger, course particles (bigger then 2.5 micrometers) that come from windblown dust and grinding operations, to the smaller, fine particles (less then 2.5 micrometers) that originate from fuel combustion, power plants, and diesel powered engines[14]. Fine particulate matter, or 'black carbon' pollution, is especially linked to human health impacts because the small particles can easily be inhaled into the deepest areas of the lungs. Studies have linked fine particulate matter, alone or in combination with other pollution, to many significant health problems like premature death, respiratory related hospital admissions, aggravated asthma, chronic bronchitis, acute respiratory symptoms (coughing and painful or difficult breathing), decreased lung functioning, and work and school absences[15]. Many of the health impacts of fine particulate matter are similar to the health impacts of ground level ozone

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[9] IBID, p.2372
[10] IBID, p.2376
[11] Anderson et al, 'Meta-analysis of Time-Series Studies and Panel Studies of Particulate Matter and Ozone', Copenhagen, Denmark: World Health Organization; 2004
[12] Thurston GD, Ito K., 'Epidemiological studies of acute ozone exposures and mortality', Journal of Exposure Analysis and Environmental Epidemiology, 2001 volume 11, p. 286-294
[13] EPA Website - Green book nonattainment areas for criteria pollutants: located at http://www.epa.gov/oar/oaqps/greenbk/o8index.html October 14th, 2005
[14] EPA Website - Health and Environmental Effects of Particulate Matter, located at http://www.epa.gov/ttn/oarpg/naaqsfin/pmhealth.html
[15] IBID

pollution. Human groups most sensitive to particulate matter are the same as those who are sensitive to ground level ozone exposure: children, the elderly, and those with pre-existing respiratory conditions. Particulate matter is also responsible for a 70% decrease in visibility from natural conditions. This phenomenon translates into a current range of 14-24 miles versus the natural visibility of 90 miles[16]. This is because the particles collect and form a grey haze, which can persist and travel with prevailing wind patterns.

A study of particulate matter by Pope et al has shown an association between long-term particulate air pollution exposure and an increased risk of adverse health outcomes[17]. The negative health outcomes included lung cancer and cardiopulmonary mortality. The study showed that a 10 $\mu g/m^3$ elevation in fine particulate and sulfur oxide related pollution was associated with a 4%, 6% and 8% increased risk of all-cause, cardiopulmonary and lung cancer mortality, respectively[18]. Another study of 12 European cities examined the short-term effects of particulate matter and sulfur dioxide exposure[19]. This study showed that a 50 $\mu g/m^3$ increase in sulfur dioxide and particulate matter caused a 3% and 2% increase in daily mortality, respectively, in western European cities[20]. Another study in Cincinnati, Ohio, showed a causal relationship between total suspended particulate matter and daily mortality[21]. This study showed a 100 micrograms/m^3 increase in total suspended particles (tsp) translated into a 1.06 higher risk of mortality, the risk for the elderly was higher at 1.09, the risk for pneumonia was 1.18 and the risk for cardiovascular disease was 1.08[22].

Particulate matter emissions are regulated by the U.S. Environmental Protection Agency. Standards are set for PM_{10} (particles less then 10 micrometers in diameter) and new standards have been set for $PM_{2.5}$ (particles less then 2.5 micrometers in diameter). PM_{10} emissions have been reduced significantly in the past 20 years, with very few locations exceeding the federal standards in the U.S. However, the $PM_{2.5}$ standards will require further actions and expenditures into emissions controls for compliance to be met in many areas of the U.S. One study attempted to quantify the health and economic benefits of reducing $PM_{2.5}$ concentrations under two assumptions: 1) that expected costs of reductions rise after the least-cost options are exhausted and 2) there is uncertainty whether a safe threshold level of $PM_{2.5}$ exists[23]. Results of this study showed that relative to the 1994-1995 ambient concentrations of $PM_{2.5}$, the nationwide health benefits of achieving the new $PM_{2.5}$ standard translates to between a $14 billion and $55 billion annually, with $32 billion the mean estimate[24].

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[16] IBID

[17] Pope, CA et al, 'Lung Cancer, Cardiopulmonary Mortality and Long-Term Exposure to Fine Particulate Air Pollution', Journal of the American Medical Association. Volume 287, No. 9, March 6, 2002. p. 1132-1141.

[18] IBID, Pope et al

[19] Katsouyanni, K, et al, 'Short term effects of ambient sulphur dioxide and particulate matter on mortality in 12 European cities; results from time series data from the APHEA project'. British Medical Journal (BMJ) volume 314, June 7, 1997, p. 1658

[20] IBID, Katsouyanni et al

[21] Schwartz, J, 'Total suspended particulate matter and daily mortality in Cinncinnati, Ohio', Environmnetal Health Perspectives, Volume 102, No. 2, February 1994, p. 186-9

[22] IBID, Schwartz

[23] Ostro B., Chestnut L., 'Assessing the Health Benefits of reducing Particulate Matter Air Pollution in the United States', Environmental Research, Volume 76, No.2, February 1998. p. 94-106

[24] IBID, Ostro & Chestnut

Carbon Monoxide poisoning is responsible for hundreds of accidental deaths each year from exposure through idling vehicles to improperly functioning fuel-burning appliances[25]. Carbon monoxide (CO) is a colorless, odorless gas that can kill a person in minutes. CO is produced whenever fuel such as gas, oil, kerosene, wood, or charcoal is burned. Symptoms of CO poisoning at low levels include shortness of breath, mild nausea, mild headaches, and can lead to long-term affects on health. Moderate levels of exposure can cause severe headaches, dizziness, mental confusion, nausea, fainting, and even brain damage or death if the levels persist for a long time[26]. Groups particularly sensitive to CO poisoning include the elderly, fetuses, infants, people with anemia, or those with a history of heart or respiratory illness. According to the Centers for Disease Control and Prevention, over 500 deaths annually are attributed to CO poisoning[27]. Most of these deaths occur when combustion engines like stoves, small gasoline engines, generators, lanterns, gas ranges, or burning charcoal and wood, are used in enclosed or partially enclosed spaces.

A study of 2,360 victims of acute carbon monoxide poisoning examined between 1976 and 1981 showed 65 (2.75% of the total) displayed delayed neurological sequelae (remnants)[28]. These 25 men and 40 women ages ranging from 34 to 80 years exhibited symptoms of mental deterioration, urinary or fecal incontinence, gait disturbances, and mutism within 2 to 40 days of CO intoxication[29]. Of the 36 patients that were followed up on for 2 years, 27 of them recovered fully within one year. Yet another study examined the relationship between ambient CO levels and hospitalization for congestive heart failure in the elderly[30]. The study examined admissions to 134 hospitals for congestive heart failure in the elderly in 10 of Canada's largest cities for an 11-year period (1981-1991). Daily high-hour ambient CO showed the highest correlation to hospital admissions among all other air pollutants studied. The relative risk for a change of 1 ppb to 3 ppb of CO concentration was 1.065[31]. Carbon monoxide exposure in the last trimester of pregnancy has also been linked to low birth weight in infants[32]. A study of pregnant women in the Los Angeles area who gave birth between 1989 and 1993 showed a significant increased risk for low birth weight. The study examined women who lived within 2 miles of 1 of 18 CO monitoring stations, the total number of infants considered was 125, 573. Various exclusions were made for premature or late births, mothers who had preexisting health concerns, and various socioeconomic variables.

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[25] EPA Website – "Protect Your Family and Yourself from Carbon Monoxide Poisoning" located at http://www.epa.gov/iaq/pubs/coftsht.html

[26] IBID

[27] CDC Website – "Protect Yourself from Carbon Monoxide Poisoning After an Emergency" located at http://www.bt.cdc.gov/disasters/cofacts.asp

[28] Choi I.S., "Delayed neurological sequelae in carbon monoxide intoxication" Archives of Neurology, July 1983 Volume 40, No. 7

[29] IBID, Choi

[30] Burnett, Richard, 'Association between ambient carbon monoxide levels and hospitalizations for congestive heart failure in the elderly in 10 Canadian cities", Epidemiology, March 1997, Volume 8, No. 2, p. 162-167

[31] IBID, Burnett

[32] Ritz B., Yu F., 'The Effect of Ambient Carbon Monoxide on Low Birth Weight among Children born in Southern California between 1989 and 1993', Environmental Health Perspectives, January 1999 Volume 107, No. 1

2.2% of infants studied (2,813) were low in birth weight[33]. Exposure to higher levels of ambient CO during the last trimester of pregnancy was associated with an increased risk of low birth weight with an odds ratio of 1.22%[34].

Ground level ozone, particulate matter and carbon monoxide are not the only forms of air pollution that affect human health, but they do represent some common forms of air pollution that are toxic to humans. Other forms of air pollution include: acid rain, smog, and noxious gases such as sulfur dioxide, nitrogen oxides and chemical vapors. Up until now, this chapter has focused on outdoor pollutants. It is important to note the indoor air pollution is also a major stressor of human health. Indoor air pollution can come in the form of tobacco smoke, vapors from or remnants of building materials (lead-based paints, asbestos insulation, etc), indoor mold, or from the use of cooking or heating appliances. Additionally, naturally occurring radioactive radon gas can be released from the earth into the basements of homes. Radon is very harmful to human health, it has been proven to cause cell damage, and lung cancer. This chapter focuses on human health stressors and diseases related to human-created pollution. For these reasons the only indoor air pollutants that will be examined are lead based paint and asbestos.

Lead in gasoline exposed Americans to health risks through outdoor air pollution. In 1973 the government started phasing out lead additives in gasoline. However, lead still remains a major public health concern in America. Lead-based paint poses a significant risk to human health. Lead is a highly toxic metal that was added to paint as a pigment to speed drying, resist moisture and corrosion, and increase durability. The United States banned paint containing more than 0.06% lead for residential use in 1978. Some industries and the military still used lead-based paint. Children are the most susceptible to lead poisoning because their brains and bodies are still developing, and because their growing bodies absorb more lead. According to the U.S. EPA, lead poisoning in children can cause damage to the brain and nervous system, behavior and learning problems, slowed growth, hearing problems, and headaches[35]. Adults can also be affected by lead. Lead exposed adults can suffer from pregnancy difficulties, reproductive problems, high blood pressure, digestive problems, nerve disorders, memory and concentration problems, and muscle and joint pain[36].

Lead-based paint is usually found in homes built before 1978. This paint can be found indoors or outdoors, in apartments, houses, or private and public housing. The most common pathway of exposure is through ingestion or inhalation of lead dust from deteriorating lead-based paint. Chipping, cracking, peeling, or otherwise deteriorating lead-based paint is particularly hazardous. Lead exposure can also result from leached lead in drinking water[37]. Many homes have plumbings that contain lead or lead solder. The lead can slowly leach from the plumbing into the water, resulting in toxic exposure.

In October of 1992 the 102nd Congress enacted the Residential Lead-based Paint Hazard Reduction Act, also referred to as Title X. The findings of this Act recognized

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[33] IBID, Ritz & Yu
[34] IBID, Ritz & Yu
[35] U.S. Environmental Protection Agency Website – Health Effects of Lead, located at http://www.epa.gov/lead/pubs/leadinfo.htm#health accessed on March 2, 2006
[36] IBID, EPA Website
[37] IBID, EPA Website

that in 1992 over 3,000,000 million American children under the age of 6 were affected by lead poisoning, with the majority being in low income and minority communities[38]. Also acknowledged was that as many as 3,800,000 American homes were assumed to contain deteriorated lead-based paint and a child under the age of 6[39]. Title X is a comprehensive effort to reduce lead hazards by setting responsibilities affecting property owners, landlords, lenders, realtor, insurers, parents, tenants, abatement contractors, inspectors, laboratories, trainers, home remodelers and state and local government agencies.

A detailed description of Title X is beyond the scope of this paper. However, it is noteworthy to understand that Title X set up new methods of reducing and evaluating lead hazards. Evaluating a lead hazard is done by a risk assessment or inspection by a licensed professional. This evaluation of lead hazards was set up because over half of the U.S. housing stock contains lead-based paint, some of which is in intact condition and poses no threat[40]. Previous legislation had defined the mere presence of lead-based paint to be a risk, which proved to be an impractical approach for the government[41]. By mandating licensed professionals to evaluate the risk associated with existing housing, government resources could be more effectively and efficiently utilized to protect those exposed to the most risk. Reducing lead hazards consisted of establishing abatement measures for severe cases and interim controls for hazards that could be managed before abatement could be performed or in place of abatement. Title X also forces landlords and realtors to disclose the presence of lead to possible tenants and homebuyers, as well as forces the government to inform the public about the dangers of lead. Some sources believe that government efforts (like Title X) have done much to reduce the risk of childhood lead exposure, yet maintain that lead poisoning remains the most common environmental health problem affecting American children[42].

Asbestos is a term given to a variety of naturally occurring fibrous silicate minerals. Asbestos is extremely resistant to fire and heat. These properties made asbestos attractive for various applications of home building, insulation and fire resistance. The three most common types of asbestos are chrysotile, amosite and crocidolite. There are friable and non-friable types of asbestos. Friable asbestos is more likely to break, dust, and crumble and is therefore more likely to be inhaled and cause damage to human tissue. Material that contains more than 1% of friable asbestos is considered to be regulated asbestos containing material (RACM). Common forms of friable asbestos can be found in acoustic ceilings and tiles, certain types of plasters, wallboard, joint compound, spray-on insulation, insulation for water heaters and pipes, etc. Non-friable asbestos is less regulated because it contains binding agents such as cement, asphalt or vinyl. These binding agents prevent the asbestos particles from being released. However, non-friable asbestos can still be hazardous if it is deteriorated

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[38] U.S. Environmental Protection Agency Website – "Residential Lead-Based Paint Reduction Act of 1992 – Title X", located at http://www.epa.gov/lead/pubs/titleten.html accessed on March 2, 2006

[39] IBID, EPA Website

[40] Housing and Urban Development Website – "A practical guide to the residential Lead-Based Paint Hazard Reduction Act of 1992', page 3, located at http://www.hud.gov/offices/lead/regs/u_titlex.pdf accessed on March 2, 2006

[41] IBID, HUD website

[42] Campbell, C & Osterhoudt, K, "Prevention of Childhood Lead Poisoning", Current Opinion in Pediatrics, Vol. 12, Issue 5, October 2000, p.428-437

through renovation, remodeling, constructing or other repairs. Non-friable asbestos can be found in asphalt roofing shingles, vinyl asbestos floor tiles, transite cement siding, etc.

Asbestos presents health hazards because its small particles easily travel through the air and into human lungs. Once in the lungs these particles can cause significant damage to tissue. Some health problems that result from asbestos exposure include asbestosis, lung cancer and mesothelioma. Asbestosis results as asbestos fibers scar lung tissue and eventually prevent the lungs from functioning properly. The latency period, the time from initial exposure to manifestation of disease, for asbestosis is 25-40 years. Lung and gastrointestinal cancer can also result from asbestos exposure, with a latency period of 15-30 years. Mesothelioma is a cancer of the outer lining of the lung and chest cavity or abdominal wall. Asbestos exposure is the only known cause of mesothelioma, with a latency period of 15-30 years[43]. According to the EPA, there has been no "safe level" of asbestos exposure found[44]. However, it has been determined that the greater the amount of asbestos and longer time period one is exposed, the greater the risk is for developing asbestos-related disease. The National Cancer Institute states that nearly everyone is exposed to asbestos at some time during his or her life[45]. However, those at risk of developing asbestos-related diseases are people who are exposed on a regular and prolonged basis.

In 1989, the EPA banned most asbestos containing products. This ban was to take place in three stages over a nine years period, to allow industries to find safe alternatives to the product. Subsequent to the 1989 ban, the U.S. asbestos manufacturers, supported by Canada (the world's second largest asbestos producer), sued the EPA. In 1991, the 5th Circuit Court of Appeals in New Orleans overturned the 1989 ban. The New Orleans Appeals court did not find fault with the science or medical opinions about the health hazards of Asbestos, rather they overturned the ban on the grounds that the EPA had technical errors in the cost-benefit analysis that was required by the Toxic Substances Control Act[46]. In 1992, the EPA's general counsel urged the Justice Department to appeal the 1991 overturning to the U.S. Supreme Court, but this never materialized[47] (the details of asbestos regulation are discussed in the government chapter). As a result asbestos was banned for all new uses, but existing products containing asbestos were still allowed. The EPA does have programs in place that require strict asbestos inspections in school buildings as well as regulations for demolishing asbestos-containing buildings.]

Stressors in Various Pathways

The effects of heavy metals on humans are wide in scope, extremely harmful, and very well documented. While there are numerous harmful heavy metals, the EPA is most concerned with Mercury, Lead, Arsenic, and Chromium. We need elemental levels of heavy metals to live and metabolize nutrients, but too much can be harmful or deadly. It is the dose that determines the benefits or costs to human health. Heavy metals do not

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[43] EPA Website – "What is Asbestos", located at http://www.epa.gov/asbestos/pubs/asbe.pdf accessed on March 7, 2006

[44] IBID, EPA Website

[45] National Cancer Institute Website – "Asbestos Exposure: Questions and Answers" located at http://www.cancer.gov/cancertopics/factsheet/Risk/asbestos accessed on March 7, 2006

[46] Seattle-Post Intelligencer, "Asbestos – It's the killer that won't die: Failure to ban fiber in U.S. imperils more lives", A. Schneider & C. Smith, February 11, 2000

[47] IBID, Seattle-Post Intelligencer

travel in one environmental medium, they have many exposure pathways through food, soil, water and air. Lead has been the heavy metal most commonly used by humans, followed by mercury and arsenic. Heavy metals are generally attracted to sulfur and can exhibit various states of oxidation. In humans, heavy metals usually accumulate in the kidneys because of the heavy blood flow the organ receives and because the organ is a waste product concentrator. Heavy metals can adversely affect the structure of protein and membrane in the kidneys and evidence of heavy metal bioaccumulation can be seen in the urine and blood of the carrier[48].

2,700 to 6,000 tons of mercury are released into the atmosphere annually from natural sources, another 2,000 to 3,000 tons are released annually by human activities like fossil fuel and coal combustion and the incineration of household and industrial wastes[49]. Once in vapor form, the mercury mixes with precipitation and eventually ends up in bodies of water. The mercury mixes with other chemicals and turns into toxic methyl mercury. Fish absorb methyl mercury from the water as they breath through their gills and feed on aquatic organisms. Mercury bioaccumulates (stores in the muscle tissue of the fish) and because of this higher levels of mercury can be found in fish at the top of the food chain. Certain fish absorb more mercury then others, generally swordfish, tilefish, king mackerel and shark tend to have higher methyl mercury levels while shrimp, canned light tuna, salmon, Pollock, and catfish tend to have lower levels[50]. However, this might change with fluctuating pollution levels. So if an area with a large shrimp population is affected by a mercury-contaminated spill, these shrimp will have higher concentrations than swordfish in less polluted waters. The government has issued guidelines for what fish are safe to eat and what fish should be avoided (available at http://www.epa.gov/waterscience/fishadvice/advice.html). In addition, periodic advisories are posted when mercury levels in fish spike from specific water bodies.

Mercury poisoning has come to the public's attention with advisories from the Food and Drug Administration (FDA), CDC, and EPA concerning methyl mercury in fish and shellfish. The concerns echoed by these government organizations have concentrated on the affects of methyl mercury poisoning of fetuses through pregnant mother's fish consumption[51], however, methyl mercury can be harmful to everyone depending on the dosage. Conflicting health messages to eat more fish for a healthy diet, and avoid fish for fear of mercury ingestion have left many people puzzled and scared. A study published in the New England Journal of Medicine showed that mercury accumulation in fish diminishes the heart-health benefits attributed to eating fish[52]. This study showed how a high level of bioaccumulated mercury led to a 2.16-increased risk ratio for myocardial infarctions[53]. In other words, if you ate fish for the cardiac benefits of the omega 3 fatty

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[48] CDC Website – 'Savannah River Site Health Effects Subcommittee Meeting minutes' located at http://www.cdc.gov/nceh/radiation/savannah/SRSHES_Toxicity_jan02.htm

[49] FDA Website – "Mercury in Fish: Cause for Concern?" located at http://www.fda.gov/fdac/reprints/mercury.html

[50] FDA Website – "Food Safety for Moms to Be" located at http://www.cfsan.fda.gov/~pregnant/newall.html

[51] CNN Website – "Unexpectedly high chemical levels found in Americans" located at http://archives.cnn.com/2001/HEALTH/03/21/chemical.exposure.02/index.html

[52] Guallar at al, 'Mercury, Fish Oils, and the Risk of Myocardial Infarction', The New England Journal of Medicine, Volume 347, No. 22, November 28, 2002. p. 1747-1754

[53] IBID, Guallar at al

acids, the mercury in the fish probably cancelled any positive effects of the omega 3 fatty acids. Fears about mercury are rational because many heavy metals, like mercury, have been proven to cause adverse health impacts including cancer and death. However, the dose is what makes the difference. Mercury is known as a PBT, a persistent, bioacculmulative, and toxic chemical. The most common side effects of mercury poisoning are nervous system disorders, central nervous system dysfunction, excessive excitement, intention tremors, behavioral abnormalities, permanent damage to the brain and kidneys, can cause cancer, damage to large intestine and stomach, permanently harms unborn children, lung damage, increased blood pressure and heart rate[54]. Most people are exposed to mercury through eating contaminated fish and shellfish, while fetuses can be exposed through the mother's blood, and infants can be exposed through the mother's breast milk.

Government regulation of mercury emissions had been met with much protest by the electrical power industry. In 1998, Congress commissioned the National Academy of Sciences to reevaluate the science used in a 1997 report by the EPA that was the basis for the establishment of stringent guidelines for toxic substance exposure. During the reevaluation process the EPA was halted from imposing stricter guidelines for mercury emissions on electrical utilities industries. The subsequent report by the NAS confirmed the EPA's original findings from 1997 and agreed that the new stricter standards were justified to protect human health. The electrical power industry did not debate the NAS and for the most part has agreed to comply with the new standards. Noteworthy to mention is the fact that the original stricter guidelines imposed by the EPA were prompted because of a 1992 lawsuit. The Natural Resources Defense Council brought this lawsuit against the EPA on the grounds that the EPA was taking too long to list coal-fired power plants as mercury sources[55].

The biggest source of lead poisoning in the U.S. is exposure through residential lead-based paint (discussed earlier in this chapter). Lead was used as a base for paint until the Consumer Products Safety Commission banned it in 1978 when it was discovered to be harmful to human health. Federal laws were set up to help eliminate lead hazards in private and publicly owned housing, however, the problem still exists today. Many government-owned, low income housing, built before 1978 still contain lead-based paint.

Lead exposure can be particularly harmful to young children. It can harm a child's brain, kidney's, bone marrow, and other body systems. At high exposure levels it can cause coma, convulsions, and even death[56]. Even at low level exposure (10µg/dL in blood) sensitive groups like infants, children, and pregnant women can display impaired cognitive function, behavior difficulties, fetal organ development impairments, and other

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[54] EPA Website – Mercury and Compounds, located at http://www.epa.gov/opptintr/pbt/mercury.htm
[55] CNN Website – "Mercuy Report Met with Optimism" located at http://archives.cnn.com/2000/NATURE/07/12/mercury.report.enn/index.html
[56] HUD website – Childhood Lead Poisoning: A Federal Strategy Targeting Lead Paint Hazards, located at http://www.hud.gov/offices/lead/reports/fedstrategy2000.pdf

problems[57]. Low levels of lead in children's blood can cause reduced intelligence, impaired hearing and reduced stature[58].

A study indicated that 16% of low-income children living in older housing are lead poisoned, compared to only 4.4% of all children[59]. Other sources of lead exposure have greatly decreased since the government banned the use of lead in gasoline, lead in food and beverage cans, lead in paint, and through reduced industrial emissions of lead. However, lead poisoning is still a major issue due to historical use of lead-based paint in the home. One proposal by the U.S. Department of Housing and Urban Development estimates that the 10-year plan they have to create 2.3 million lead safe homes for low-income families with children will yield net benefits of $8.9 billion[60].

In February of 2006 the State of Rhode Island won a first-ever verdict against the makers of lead-based paint. The suit was against three major lead-based paint manufacturers, Sherwin-Williams, NL Industries and Millennium Holdings LLC. These companies will be forced to clean out lead contamination in over 300,000 homes as well as pay out billions of dollars in damages. The jury decided that the lead contamination of homes was a public nuisance created by the paint companies that violated that public's right to clean health[61]. Rhode Island lawyers claimed that these companies produced, sold and marketed lead-based paint long after its toxic effects were known. Lawyers for the defendants claimed that this was untrue, and that lead paint contamination is not the source for the region's high child lead poisoning incidence. Several similar city and local lawsuits are pending in Wisconsin, New Jersey, California, New York, Texas, and Missouri. Multiple sources state that other States are considering filing similar lawsuits. The Rhode Island verdict presents a valuable precedent to these municipalities, cities and states.

Arsenic is found throughout the environment, though the most common exposure routes are through food and water. Many aquifers in the United States have arsenic in them. This map from the USGS illustrates arsenic levels in U.S. groundwater:

*map courtesy of USGS located at http://water.usgs.gov/nawqa/trace/pubs/geo_v46n11/fig1.html

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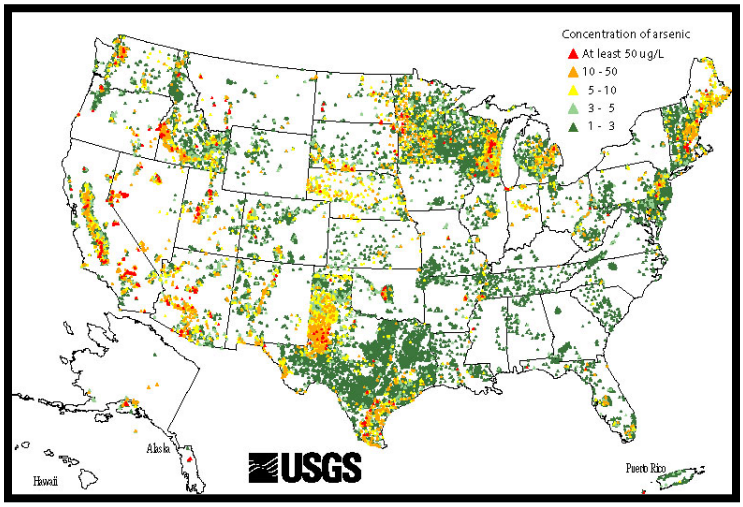
[57] Committee on Measuring Lead in Critical Populations, Board on Environmental Studies and Toxicology, Commission on Life Sciences, 'Measuring Lead Exposure in Infants, Children and Other Sensitive Populations', National Academy of Sciences, Washington, DC, 1993

[58] Agency for Toxic Substances and Disease Registry, 'Case Studies in Environmental Medicine: Lead Toxicity', U.S. Dept. of Health and Human Services, revised Sept. 1992

[59] Centers for Disease Control and Prevention, 'Update: Blood Lead Levels – United States 1991-1994', Morbidity and Mortality Weekly Report, U.S. Department of Health and Human Services, Vol. 46, No.7, February 21, 1997, p.141-146 (Vol. 46, No. 26, p. 607)

[60] HUD Website – Childhood Lead Poisoning: A Federal Strategy Targeting Lead Paint Hazards, located at http://www.hud.gov/offices/lead/reports/fedstrategy2000.pdf

[61] Boston Globe Website – "Rhode Island wins lead paint suit", by Raja Mishra, February 23, 2006, located at http://www.boston.com/news/local/articles/2006/02/23/rhode_island_wins_lead_paint_suit/ accessed March 19, 2006



Short-term high-level exposure through inhalation of inorganic arsenic dust or fumes can cause gastrointestinal effects like nausea, diarrhea, and abdominal pain, and some nervous system disorders. More often exposure is chronic, long term, low-level exposure through inhalation or ingestion. Symptoms of this type of exposure are irritation of the skin and membranes, gastrointestinal effects, anemia, peripheral neuropathy, skin lesions, hyper-pigmentation, and liver or kidney damage[62]. The EPA classifies inorganic arsenic as a human carcinogen, attacking the lungs when inhaled and the skin, bladder, liver, and lungs when ingested. Organic compounds (arsenic combined with carbon and hydrogen) of arsenic are generally non-toxic, however gaseous arsine and inorganic arsenic (arsenic combined with oxygen, chlorine, and sulfur) are highly toxic[63].

Historical uses of inorganic arsenic have been in wood preservation to prevent rot and infestation; arsine is used in the microelectronics industry and semiconductor manufacturing. Inorganic arsenic is released through volcano eruptions, chemical weathering and from human industrial and commercial processes. Food and water are the major sources of human exposure to arsenic, with fish and shellfish being the highest food sources of organic arsenic concentrations. Soil may also contain arsenic from mineral deposits or from human related contamination. Most toxic exposure to humans is from living near a metal smelter or hazardous waste site, or from burning treated wood.

The Safe Drinking Water Act, the Clean Water Act, and the Superfund law (the Comprehensive Environmental Response, Compensation and Liability Act - CERCLA) are the main sources of regulation for arsenic. The EPA is responsible for enforcing these laws and dealing with problems related to them. However, there has been a serious lag between the time that arsenic was found to be harmful in long-term medium level exposures in 1986, to the time the EPA began to act in 2000. In 2001 the EPA set a new standard of 10ppb for arsenic in drinking water, to take effect in 2006. The use of copper chromium arsenate (CCA) treated wood in new construction was banned by the EPA to reduce arsenic releases. It is illegal to burn arsenic treated wood in all 50 states. Additionally, CERCLA mandates how arsenic treated wood must be disposed of in

[62] EPA Website – Arsenic Information, located at http://www.epa.gov/ttn/atw/hlthef/arsenic.html
[63] IBID

special landfills. One problematic fact is that arsenic acts like a hazardous waste since it does not degrade or breakdown, so disposal is an important issue.

Chromium is present in the environment in many different forms, namely chromium (0), Chromium (III) and Chromium (VI). Chromium (VI) is used for chrome plating, dyes and pigments, leather tanning and wood preservation, and chromium (0) is used for making steel[64]. Both forms are highly toxic. Exposure to toxic chromium can come from eating contaminated food, drinking contaminated well water, or living near an uncontrolled hazardous waste site or industries that use chromium. Chromium (VI) is considered carcinogenic to humans; when inhaled it can cause irritations to the nose, like nosebleeds, runny nose, ulcers and holes in the nasal septum. If ingested, it can cause stomach irritation, ulcers, convulsions, kidney and liver damage, and even death. Dermal contact can cause sever skin irritation and ulceration[65].

There are several workplace regulations for chromium and chromium salts imposed by organizations like the American Conference of Governmental Industrial Hygienists, National Institute for Occupational Safety and Health and the Occupational Safety and Health Administration. Regarding protection of the general public, the EPA has a maximum contaminant level for total chromium of 100 $\mu g/m^3$ for drinking water and no standard for chromium in the air. Chromium VI is naturally occurring in many Southern California Aquifers, though most Chromium VI comes from human activities. Several bills have been introduced to deal with these problems, namely; Senate Bill 351 - Drinking Water Standards, Senate Bill 460 – Water Treatment Demonstration Project, and Senate Bill 472 – Risk Study of the Chino Basin Aquifer[66]. I could not find information regarding the adoption or dismissal of these bills.

The EPA defines a pesticide as any substance intended for preventing, destroying, repelling, or mitigating any pest. 90% of symptomatic cases display only minor symptoms that require no medical treatment other then hydration and observation in a home setting[67]. Pesticide poisoning can often be a common occurrence, usually left undiagnosed or unnoticed in mild cases. Pesticide exposure can come through inhalation, ingestion, or dermal contact. The majority of pesticide poisonings are related to occupational settings. However, the public is often exposed to pesticides through FDA allowable residues in the food supply, drinking well water contamination, commercial and industrial applications in agricultural use, and mosquito and weed control along roads and canals[68]. There are more then 865 active ingredients registered with the government as pesticides, 350 of which are used in foods we eat and to protect our homes and pets[69]. The government researches and regulates pesticides, including examining studies to determine the acute, short-term and long-term exposure effects of particular pesticides. The EPA determines what pesticides can be approved for use through risk assessments.

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[64] Agency for Toxic Substances and Disease Registry Website – located at http://www.atsdr.cdc.gov/tfacts7.html
[65] IBID
[66] Chromium Research Council Website – located at http://www.cr-cleanup.com/
[67] EPA Website – Recognition and Management of Pesticide Poisoning, 5th Edition – Introduction, located at http://www.epa.gov/pesticides/safety/healthcare/handbook/Chap01.pdf
[68] ATSDR Website – Churchill County, Nev Media Announcement, located at http://www.atsdr.cdc.gov/NEWS/churchillcountynv072403.html
[69] EPA Website – Assessing Health Risks from Pesticides, located at http://www.epa.gov/pesticides/factsheets/riskassess.htm

These risk assessments study the individual affects of particular pesticides to ascertain the amount of risk they pose to human health. Cumulative risk assessments are performed to evaluate risks to human health that are associated with multiple pesticide exposures. The EPA also assigns a "reasonable certainty of no harm" to pesticides residues allowed to remain on food. However, other agencies are involved in this process including the FDA, State enforcement agencies, and the Department of Agriculture.

In 2003, four U.S. states sued the EPA alleging that the federal agency is failing to protect children from pesticide related health risks[70]. New York Attorney General Eliot Spitzer, Connecticut Attorney General Richard Blumenthal, Massachusetts Attorney General Tom Reilly, and New Jersey Attorney General Peter Harvey all allege that the EPA is not protecting children from the risks of excessive pesticide residue on foods. They base this claim on the fact that children are more susceptible to negative health affects of pesticides. This is because children's bodies are still rapidly developing, lack the metabolic resistance to many pesticides, and consume more food for their size than adults. Congress passed the Food Quality Protection Act (FQPA) in 1996 to account for the increased risks posed to children from pesticides. These four states assert that the EPA has failed to carry out the congressional mandates of the FQPA. This lawsuit focused on five major pesticides (Alachlor, Chlorothalonil, Methomyl, Metribuzin, and Thiodicarb) used on common foods that children eat on a daily basis, such as corn, wheat, rice, apples, etc. Many environmental organizations agreed with the allegations of these states and applauded their efforts in suing the Bush Administration-led EPA[71].

There are many different health effects associated with particular types of pesticides. Organophosphates and carbamates can affect the nervous system. Other types of pesticides affect the endocrine system, can cause eye or skin irritations, immune system problems, reproductive dysfunction, and can be carcinogenic. Some pesticides are considered to be Persistent Organic Pollutants (POPs). POPs are organic compounds that are toxic, and they persist in the environment because they resist degradation through chemical, biological and photolytic processes. This characteristic of POPs allows them to bioaccumulate in human and animal tissue, travel long-range distances, and have adverse effects on human health and the environment. POPs are not well understood by the scientific community, especially concerning their chronic effects. Some well known pesticide POPs are aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, and toxaphene. These and other POPs are able to travel through the air, oceans and other mediums to circulate the globe.

Historically there have been many examples of pesticides and POPs that negatively affected human health, such as DDT. DDT is a chlorinated organic pesticide first used in World War II to combat mosquitoes and insect-borne illnesses. DDT has a long half-life in the environment and can bioaccumulate in human and animal tissue. This makes DDT a very pervasive pesticide that spreads and stays in the environment long after its initial application and intended use. While it is highly effective as a pesticide it had many negative environmental and health impacts. DDT has been shown to harm bird reproduction by thinning eggshells, is toxic to aquatic life, cause cancer in

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[70] NY State Office of the Attorney General Website – "States sue EPA for failing to protect children from pesticides", located at http://www.oag.state.ny.us/press/2003/sep/sep15a_03.html accessed on March 10, 2006

[71] IBID, NY States Attorney General's Office

animals, nervous system disorders in humans, can be passed to infants through breast milk, cause premature births and reproduction problems, and is linked to cancer in humans. The link between DDT and human cancer has been hotly debated. A 1993 study by Dr. Mary Wolff suggest that women with high exposure to DDE (a major metabolite of DDT) were four times more likely to develop breast cancer than those women who were exposed to low levels[72]. However, a 1997 study by Dr. Hunter at the Harvard School of Public Health determined that there was no association between DDT and increased breast cancer risk[73]. The Department of Health and Human Services has determined that DDT may reasonably be anticipated to be a human carcinogen[74].

According to the Agency for Toxic Substances and Disease Registry (ATSDR), most people are exposed to DDT through eating contaminated food (fish, fruits, and vegetables) or drinking water. DDT was banned for widespread use in 1972, however some uses of the pesticide are still permitted. Currently, OSHA regulates DDT exposure in the workplace, while the FDA regulates DDT levels in foodstuffs. Many sources argue that the benefits of reducing malaria through DDT use outweigh the negative aspects of the pesticide. After all the inventor of DDT, Paul Herman Mueller, was awarded a Nobel Prize for his invention because it halted many insect-borne diseases. However, even those who endorse its use to reduce malaria maintain that the pesticide is dangerous and must be banned as soon as a reasonable malaria reducing agent is discovered[75].

In 2001, President Bush endorsed the Convention on Persistent Organic Pollutants in Sweden. This treaty commits signatory countries to reduce and/or eliminate the production/release of the top 12 POPs. In 2002, the Stockholm Convention on Persistent Organic Pollutants was submitted to the U.S. Senate for approval and ratification. In order for the United States to join the Stockholm Convention several things will have to happen[76]. First, Congress must adopt and the President must sign amendments to the Toxic Substances Control Act (TSCA) and the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) to bring these laws up to the new international standards. Second, the Senate must offer its "advice and consent" to the treaty which requires a two-thirds majority vote. Lastly, the President must deposit the U.S. instrument of ratification with the United Nations. The domestic process of ratifying the Stockholm Convention has dragged on for many years and has still not been completed. The World Wildlife Fund claims that this is because the Bush Administration has tried to incorporate controversial language into the bill that would insulate U.S. action from the mandates of

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[72] Wolff, Mary, "Blood Levels of Organochlorine Residues and Risk of Breast Cancer" Journal of the National Cancer Center Institute, Volume 85, No. 8, April 1993, p.648-652

[73] Hunter, David J, "Plasma Organochlorine Levels and the Risk of Breast Cancer", The New England Journal of Medicine, Vol. 337, No.18, October 30, 1997, p.1253-1258

[74] Agency for Toxic Substances and Disease Registry Website – DDT Facts, located at http://www.atsdr.cdc.gov/tfacts35.html accessed on March 14, 2006

[75] The International Development Research Centre Website – "The DDT Dilema: To Ban or Not to Ban, That's Not the Question", located at http://www.idrc.ca/en/ev-5593-201-1-DO_TOPIC.html accessed on March 14, 2006

[76] The Center for International Environmental Law Website – U.S. Ratification of the Stockholm Convention", located at http://www.ciel.org/Chemicals/Stockholm_US_Ratification.html accessed on March 14, 2006

the international binding agreement[77]. However, the Bush Administration has publicly supported the Stockholm Convention, noting "This treaty shows the possibilities for cooperation among all parties to our environmental debates. Developed nations cooperated with less-developed nations. Businesses cooperated with environmental groups. And now, a Republican administration will continue and complete the work of a Democratic administration."[78] After France signed on as the 50th nation to ratify on February of 2004, The Stockholm Convention became active. To date, the United States has not ratified the Stockholm Convention.

The most common pesticides involved in adverse health events are listed below:

PESTICIDES MOST OFTEN IMPLICATED IN SYMPTOMATIC ILLNESSES, 1996

Rank	Pesticide or Pesticide Class	Child < 6 years	Adults 6-19 yrs.	Total*
1	Organophosphates	700	3274	4002
2	Pyrethrins and pyrethroids**	1100	2850	3950
3	Pine oil disinfectants	1336	903	2246
4	Hypochlorite disinfectants	808	1291	2109
5	Insect repellents	1081	997	2086
6	Phenol disinfectants	630	405	1040
7	Carbamate insecticides	202	817	1030
8	Organochlorine insecticides	229	454	685
9	Phenoxy herbicides	63	387	453
10	Anticoagulant rodenticides	176	33	209
	All Other Pesticides	954	3604	4623
	Total all pesticides/disinfectants	7279	15,015	22,433

* Totals include a small number of cases with unknown age.
** Rough estimate: includes some veterinary products not classified by chemical type.

Source: American Association of Poison Control Centers, Toxic Exposure Surveillance System, 1996 data.

Conclusion About Environmental Stressors

Human health is certainly being affected by human-induced pollution. Air pollution remains the most prevalent medium for pollutants. Many pollutants start off by being released into the air, but can cycle through water, land, and biological organisms during their lifespan. Air pollution is a problem, but there are many pollutants that are released into water, food or land that can also be harmful to human health. Many studies

[77] World Wildlife Fund Website – Stockholm Convention on Persistent Organic Pollutants: Promoting International Controls on Toxic Chemicals, located at http://www.worldwildlife.org/toxics/projects/project2.cfm accessed on March 14, 2006

[78] U.S. Department of State Website – President Bush Sends the Stockholm Convention on Persistent Organic Pollutants to Senate for Ratification, located at http://www.state.gov/g/oes/rls/prsrl/press/jan/9748.htm accessed on March 14, 2006

have linked pollution to increased hospital or emergency room visits, aggravation of existing conditions, physical dysfunctions, and a generally decreased quality of life. Establishing a causal relationship between human induced pollution and negative affects on human health is logistically difficult. Latency periods, varying exposure times, changing dose amounts, and multiple, compounding pollutant pathways all present difficulties in proving causal relationships. While several relationships have been established, the correlations have been low, and not significant enough to garner widespread attention from scientists, regulators, or the public.

There are economic pressures from existing industries, lobby groups, politicians, and corporate stakeholders to reduce costs and keep operating expenses down. Many pollution controls require industry to purchase equipment to modify pollution releases, change their processes to exclude harmful pollutants, and eliminate or refine products that contain harmful substances. All these regulatory actions cost industry and corporations money. In turn, this puts pressure on lobby groups to appeal to politicians to make concessions and easements on the regulations. Many of these appeals are made on the grounds that regulations would force industry to cut jobs, pass higher costs to consumers, or force the industries to cease operations. Politicians are concerned with the livelihood of their voters so they do not want to see people lose their jobs, or have consumers unable to afford needed goods, or face the absence of industries that people depend on like power, chemical manufacturing, etc. Therefore, environmental quality is often sacrificed for the 'good of the people'. However, strict pollution control and economic productivity do not have to be mutually exclusive. There are actions that can be taken by the government and industries that could help realize sustainable chemical production that would protect human health and economic progress, such as those recommended by University of Massachusetts researchers (discussed later in this chapter)[79]. However, undertaking these production shifts would require capital investments that could negatively impact short-term profits. This is unacceptable to managers and stakeholders in current corporate structures.

An industrial hegemony has resulted as industry leaders garnered control over powerful economic and social resources that the population has grown dependant on. This national dependence gives industry a distorted sense of control over markets and politicians. Only with time, scientific proof, and public outcry will these powerful hegemonies be properly regulated. Politicians are subjected to arguments from both sides, the public and industry, yet they are insulated from both. Politicians are insulated from the chemical industry because they know industry is important to our society, but they are not privy to internal (non-public) balance sheets, technological possibilities, and legitimate financial statements, so they can't objectively assess claims from industry. While they might know the financial situations of some public corporations, they cannot account for stakeholder desire for profits. Stakeholders fuel our economy and pollution regulations often decrease profits, which give disincentives to stakeholder investments. Politicians who affect policy are often insulated from the public. They are well paid, highly educated, and can spend more time in Washington D.C. then in the areas they are representing. These politicians ought to be highly educated and well compensated for their hard work. Yet their elite status might make them unable to relate to or understand

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[79] Tickner, Geiser & Coffin, "The U.S. Experience in Promoting Sustainable Chemistry", Environmental Science and Pollution Research, Volume 12, Number 2, March 2005, pgs. 115-123

the needs of the U.S.'s large population of poorly educated, low-income citizens. Campaign contributions, business lunches, professional friends, and affiliations (other then those of their representative public) often serve to further insulate politicians from the public. These politicians who shape public policy can be influenced more by those around them, then by less intimate public needs or scientific data. This is flaw of our system. Sometimes the appropriate public concerns are balanced with political logistics, and sometimes they are not. It is the public's responsibility to participate in the governmental process by voting and voicing concerns about the dangers of industrial pollution. Voting and public participation are the only checks and balances the unorganized public-at-large has to offset industrial and political control over America.

Uncertainty about the dangers of environmental pollutants, stemming from the difficulties in proving causal relationships, is a large barrier to enacting strict pollution regulations. Perhaps as more studies are conducted, more evidence is presented, pollution problems increase, and the U.S. population becomes more sensitive (the elderly population is growing as the baby boomers are aging) these issues will be forced into the public's eye. As the world's population increases and pollution proliferates, more direct causal relationships will be observed. Economic interests of the producers of pollution can only be trumped if there is scientific proof that the public at large is suffering. While evidence suggests that the public is bearing the burden of polluters, this evidence is not pervasive enough and public knowledge about the problem of environmental pollution has not proliferated. If the public is not aware of the environmental risks that surround them, they cannot act appropriately in the political process to protect themselves.

Part II - Diseases Related to Environmental Health and Anthropogenic Pollution

Introduction

The earth's environment plays an integral role in sustaining life on the plant, particularly human life. Human activity has created many sources of pollution that have harmed the atmosphere and ecosystems of the earth. Not only has the environment suffered because of man-made pollution, there is evidence that human health is also suffering. Many toxic chemicals and pollutants that are released into the environment have multiple adverse affects on human health. Some diseases that have a relationship to environmental pollution include asthma, developmental toxicity, neurotoxicity (Autism Spectrum Disorders), and developmental disabilities in children, cancer and cancer clusters, ADHD, Endocrine Disruptions, Parkinson's disease, methemoglobinemia and atherosclerosis. Lead poisoning is another important environmentally related disease. Since the first section of this chapter examined issues related to lead and lead poisoning, it will be left out of this section. While certain genetic factors, lifestyle choices, and sensitivities make these diseases more likely to manifest, environmental factors are increasingly being linked to these diseases.

This section will examine these diseases, the evidence that has linked environmental pollution to their onset, monetary costs of these diseases, and how some regulations in the United States have served to perpetuate the problem instead of curtailing it. The first section of this chapter illustrated and explained many pervasive types of environmental pollution. That information should help make connections between the types and prevalence of human diseases caused by such pollutants.

Diseases Related to Environmental Pollution

Asthma – Asthma is a chronic respiratory disease that displays 'attacks' in response to asthma triggers. An asthma attack occurs when the airways become inflamed and narrowed in reaction to a trigger. Symptoms include shortness of breath, coughing, wheezing, chest pain or tightness, or a combination of these symptoms. Some asthma triggers are allergens, infections, exercise, sudden weather changes, cockroaches, exposure to airway irritants like tobacco smoke, pollutants, etc…Asthma attacks range from mild to life-threatening.

The Centers for Disease Control and Prevention's National Center for Health Statistics state that, "the burden of asthma has increased over the past two decades (1980-1999)"[80]. Asthma prevalence has increased nearly 70% from 1984-1986 to 1995-1996, a percentage increase that has far outpaced the 12% increase in population growth[81]. In 2002, 30.8 million people (111 per 1,000 people) in the United States had been diagnosed with asthma during their lifetime. In adults, 106 per every 1,000 people (21.9 million people) had a lifetime asthma diagnosis, while children 0-17 years had 122 per every 1,000 people (8.9 million)[82]. Additionally, Puerto Ricans are almost 80% more likely to be diagnosed with asthma compared to non-Hispanic white, while non-Hispanic blacks and American Indians are about 25% more likely than their non-Hispanic white counterparts to be diagnosed with asthma[83].

Asthma is especially affecting the child population. Evidence indicates that from 1980 to 1995, asthma prevalence in persons 0-17 years of age increased by 5% each year[84]. Some of the increased asthma incidence can be attributed to early-life environmental risk factors. A study by Muhammad Towhid Salam et al displayed significant correlations between environmental exposure during the first year of life and the subsequent onset of asthma. The study showed that an asthma diagnosis before the age of 5 was associated with exposures in the first year of life to: wood or oil smoke, soot, or exhaust (Odds Ratio(OR) – 1.74; 95% Confidence Interval (CI), 1.02-2.96), cockroaches (OR – 2.03; 95% CI, 1.03-4.02), herbicides (OR – 4.58; 95% CI, 1.36-15.43), pesticides (OR – 2.39; 95% CI, 1.17- 4.89), and farm crops, farm dust, or farm

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[80] CDC Website – The National Center for Health Statistics 'Asthma Prevalence, Health Care Use, and Mortality, 2002', located at http://www.cdc.gov/nchs/products/pubs/pubd/hestats/asthma/asthma.htm - accessed on December 12, 2005

[81] Chestnut LG, Mills DM, Agras J., 'National Costs of Asthma for 1997'. (EPA Contract 68-W6-0055) Boulder, CO: Stratus Consulting Inc., 2000

[82] OPCIT (CDC Website)

[83] IBID

[84] CDC Website – "Measuring Childhood Asthma Prevalence Before and After the 1997 Redesign of the National Health Interview Survey – United States" from the Morbidity and Mortality Weekly Report – located at http://www.cdc.gov/mmwr/preview/mmwrhtml/mm4940a2.htm - accessed December 12, 2005

animals (OR – 1.88; 95% CI, 1.07 – 3.28)[85]. The self-reported rate for asthma has increased 75% from 1980 to 1994 and in 1994 alone 13.7 million people had reported asthma during the past year[86]. The most substantial increase occurred among children age 0-4 years (160%, from 22.2 per 1,000 to 57.8 per 1,000) and persons aged 5-14 years (74%, from 42.8 per 1,000 to 74.4 per 1,000)[87].

While there are no studies that directly attribute air pollution as a cause of asthma, many studies confirm that common outdoor air pollutants have been convincingly shown to aggravate asthma[88]. Some of the signs of aggravation include pulmonary function decrements, increased bronchial hyper-responsiveness, visits to emergency departments, hospital admissions, increased medication use and symptom reporting, inflammatory changes, interactions between air pollution and allergen challenges, and immune system changes[89]. Other studies have linked increases in childhood lung diseases (like asthma) to "the recent increase in complexity and distribution, if not the levels, of airborne pollutants, including environmental tobacco smoke, diesel exhaust, respirable particulate matter ($PM_{2.5}$, and PM_{10}) and irritant gases (ozone, sulfur dioxide and nitrogen dioxide)"[90].

Asthma mortality and morbidity rates continue to plateau or decrease. Mortality figures have declined since 2001, with the number of deaths attributed to asthma being approximately 8.5% lower than the number of deaths in 1999[91]. This decline in mortality and morbidity is widely attributed to better identification, control, and maintenance of the disease by the medical community.

Developmental Toxicity, Neurotoxicity, and Developmental Disabilities - The term 'developmental toxicity' can be interchanged with "toxicity to children", which is defined as adverse effects on the developing organism that may result from exposure prior to conception (to either parent), during prenatal development, or postnatally to the time of sexual maturation[92]. Important to note is the fact that many human physiological systems, like the skeletal and reproductive systems, do not mature fully until early adulthood at 18-21 years of age. Therefore, exposure periods related to developmental toxicity can begin from before conception until the child reaches 18-21 years of age.

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[85] Muhammad Towhid Salam et al, "Early-Life Environmental Risk Factors for Asthma: Findings from the Children's Health Study", Environmental Health Perspectives, Vol. 112, No. 6, May 2004, p. 760-765

[86] Mannino et al., "Surveillance for Asthma – United States, 1960-1995" CDC's Morbidity and Mortality Weekly Report, Volume 47 (SS-1), April 24, 1998, p. 1-28

[87] IBID

[88] An example of one of these studies is by - Koren, H.L., "Association between criteria air pollutants and asthma", Environmental Health Perspectives Supplements, Volume 103, No. S6, September 1995

[89] Koenig JQ, "Air Pollution and Asthma", Journal of Allergy and Clinical Immunology", (4 pt. 1) Oct. 1999, p. 717-722

[90] Plopper and Fanucchi, "Do Urban Environmental Pollutants Exacerbate Childhood Lung Disease?", Environmental Health Perspectives, Guest Editorial, Vol. 108, No. 6, June 2000. p. A252-253

[91] American Lung Association Website – Epidemiology & Statistics Unit Research and Program Services, "Trends in Asthma Morbidity and Mortality", May 2005 – Located at http://www.lungusa.org/atf/cf/%7B7A8D42C2-FCCA-4604-8ADE-7F5D5E762256%7D/ASTHMA1.PDF - accessed on December 12, 2005

[92] EPA Website – The Office of Pollution Prevention and Toxics' Proposed Test Battery for the Children's Health Testing Program, located at http://www.epa.gov/scipoly/sap/1999/may/oppt_test.htm accessed on November 27, 2005

The negative impacts of chemical exposure during development can be detected at any point in the life span of a human. The categories of developmental toxicity manifestation are 1) death of the developing organism (still birth, spontaneous abortion, sudden infant death syndrome), 2) structural abnormalities (birth defects), 3) altered growth (growth retardation, delayed development of secondary sexual characteristics during adolescence, etc), 4) functional deficits (mental retardation, learning deficits, respiratory diseases, immune disfunction, infertility, etc), and cancers are also considered[93]. The child's level of developmental maturity and the underlying developmental processes that are occurring during exposure will determine the negative health affects from that exposure. The systems of an adult are more stable and stronger then those of a child; therefore, chemical exposure for an adult will result in different outcomes then exposure for a child.

The less developed (younger) a child is, the more sensitive they are to chemical exposures. This is because biological systems in embryos, fetuses and infants are just forming and are subject to many perturbations, rapid cell divisions, and incomplete maturation of enzyme systems for activation or detoxification of potentially toxic chemicals[94]. A small mutation caused by chemical exposure in early development can lead to exponential mutations in the future. To illustrate this, imagine that a house is built on foundation that is not stable (polluted environment). No matter how solid the construction of the house (or the genetic characteristics of the child), structural problems will ensue as the foundation settles and the construction scheme is distorted. Developing embryos and fetuses are the most sensitive to chemical exposures as they are in the earliest stages of development, where the most basic human structures are formed.

Developmental disabilities can result from developmental toxicity. Currently, there are over 4.5 million individuals in the United States who have developmental disabilities[95]. Developmental disabilities are classified as "severe, life-long disabilities attributable to mental and/or physical impairments, manifested before age 22"[96] Individuals with developmental disabilities are limited from many everyday activities including, but not limited to; the ability to live independently, economic independence or self-sustainability, learning, mobility, expressive or coherent language, self-care, or self-direction[97].

Developmental neurotoxicity is a subset of developmental toxicity concerning the development of the nervous system in children, which is particularly sensitive to chemical exposure. Developmental neurotoxicity is a broad term related to many diseases like autism spectrum disorders (autism, cerebral palsy, mental retardation), ADHD, dyslexia, etc., that are caused by either genetic factors, environmental exposures, a combination of both, or other unknown factors. Currently, the scientific community knows the causes of fewer then 25% of these neurodevelopmental disabilities[98], a fact

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[93] IBID
[94] IBID
[95] U.S. Department of Health and Human Services Administration for Children and Families Website – Administration on Developmental Disabilities Fact Sheet located at http://www.acf.hhs.gov/programs/add/Factsheet.html - Accessed December 7, 2005
[96] IBID
[97] IBID
[98] Weiss & Landrigan, " The Developing Brain and the Environment: An Introduction", Environmental Health Perspectives, Volume 107, Supplement 3, June 2000

that has motivated many to increase research into these diseases. Another motivating factor is that 3-8% of the 4 million babies born a year in the U.S. are affected by developmental neurotoxicity. While it is well established that the human nervous system is vulnerable to environmental chemicals, the contribution that these exposures make to the development of diseases like attention deficit disorder, conduct problems, pervasive developmental disorders, or autism spectrum disorders remains uncertain[99].

Autism Spectrum Disorders (or pervasive developmental disorders) are characterized by varying degrees of impairment in communication skills, social interactions, and restricted, repetitive and stereotyped patterns of behavior. Additionally, children with autism spectrum disorders may display unusual responses to sensory experiences, such as certain sounds or appearance of an object. Autism spectrum disorders can range from the severe form, called autism, to a milder form, called Asperger Syndrome. ASD usually appears within a few months after birth to12 to 36 months of age, when differences in the way the child reacts to people and other unusual behaviors become noticeable[100]. Many children with ASD have some degree of mental retardation, particularly in areas related to language. One in four children with ASD develop seizures either in early childhood or adolescence[101]. While patients with ASD often display significant intellectual disabilities, some can manifest above average intellectual capacities, especially those with the milder Asperger Syndrome[102].

Current estimates indicate that ASD is increasing in prevalence, from the original estimate of 4 per 10,000 children, to estimates from the past 10 years that indicate 60 per 10,000 children, worldwide display the disease[103]. While there are no formal studies that calculate the number of children in the United States that have ASD, the CDC estimates that 24,000 of the 4 million children born in the United States each year will have some form of ASD[104]. It is unclear whether this increase in prevalence is due to increased education and diagnosis of the disease or to actual increases in the occurrence of the disease.

Causes of ASD are not understood fully, but the disease is caused by abnormalities in brain structure or function. These abnormalities are mostly attributed to genetics, but environmental factors also play a role, as do a combination of the two. There are recognized and proven environmental risk factors that have causal relationships to ASD such as exposure to thalidomide or anti-convulsant consumption during pregnancy[105]. Other environmental factors include viral infections, metabolic imbalances, and exposure to environmental chemicals. The Autism Society of America (ASA) states that the Agency for Toxic Substances and Disease Registry prepared a study

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[99] Deitrich et al., "Principles and Practices of Neurodevelopmental Assessment in Children: Lessons Learned from the Centers for Children's Environmental Health and Disease Prevention Research", Environmental Health Perspectives, Vol. 113, No. 10, October 2005

[100] National Institute of Mental Health Website – located at http://www.nimh.nih.gov/publicat/autism.cfm - access on December 13, 2005

[101] IBID

[102] Prior M, "Is There a n Increase in the Prevalence of Autism Spectrum Disorders?", Journal of Paediatrics & Child Health, Vol. 39, Issue 2, March 2003, p. 81-82

[103] IBID

[104] CDC Website – Autism Home located at http://www.cdc.gov/ncbddd/autism/asd_common.htm accessed on December 13, 2005

[105] Szatmari P, "The Causes of Autism Spectrum Disorders", British Medical Journal, Vol. 326, January 25, 2003, p. 173-174

to determine if there was a link between hazardous chemical exposures and autism, but found no compelling evidence to suggest there was[106]. The ASA argues that this study included limited research and did not rule out the link between hazardous chemical exposure and autism, maintaining that more research is needed[107]. There are many chemicals that have the capacity to cause neurodevelopmental disabilities and abnormalities in the brain structure or function, such as; lead exposure, polychlorinated biphenyls, organic mercury, and certain pesticides, not to mention the 80,000+ chemicals registered with the EPA that have little information on their toxic potential[108]. While this does not constitute a direct causal relationship to ASD, the possibility that these substances could alter genetics and cause physiological changes in developing neurological systems is very real. Wilson and Olden describe the relationship between genes and the environment to a loaded gun and its trigger, "A loaded gun by itself causes no harm, it is only when the trigger is pulled that the potential for harm is released. Genetic susceptibility creates an analogous situation, where the loaded gun is one or a combination of susceptibility genes and the trigger is an environmental exposure"[109]. The need for more research into the role environmental factors play in the development of ASD is clear. In an effort to increase the level of understanding about environmental risk factors and autism, in 2001 the National Institute of Environmental Health and the U.S. EPA created 4 new research centers to study this relationship[110].

Attention Deficit Hyperactive Disorder (ADHD), a type of neurodevelopmental disorder, is a condition characterized by inattention, hyperactivity and impulsiveness, most often appearing in the early life of a child. While many children display these characteristics in varying levels at various times, a child with the disorder will display them in such a manner that the actions negatively interfere with school performance, social relationships, and behavior at home. Diagnosis by a medical professional is necessary to determine if a person is just displaying symptoms of ADHD, or if they really have the disorder. There are three types of ADHD, the predominantly hyperactive-impulsive type, predominantly inattentive type, and the combination type. It is estimated that 3-5% of children in the United States have ADHD, or approximately 2 million children[111].

Causes of ADHD include; exposure to environmental factors such as lead, cigarette smoke or alcohol consumption by a pregnant mother, additives in food, brain injuries, and/or genetics[112]. One study published by the European Molecular Biology Organization identifies an enzyme present in children with ADHD that is specifically targeted by organophosphates, which are the base for many pesticides and chemical

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[106] Autism Society of America Website – What causes Autism located at http://www.autism-society.org/site/PageServer?pagename=autismcauses accessed on March 14, 2006
[107] IBID, ASA Website
[108] Weiss & Landrigan, " The Developing Brain and the Environment: An Introduction", Environmental Health Perspectives, Volume 107, Supplement 3, June 2000
[109] Olden & Wilson, "Environmental health and genomics: visions and implications", Nature Reviews. Genetics, Vol. 1, no. 2, Nov 2000, p. 149-53
[110] Wakefield, J, "New Centers to Focus on Autism and Other Developmental Disabilities", Environmental Health Perspectives, Vol. 110, Issue 1, Jan 2002, p. A20
[111] National Institute of Mental Health Website – located at http://www.nimh.nih.gov/publicat/adhd.cfm accessed on December 13, 2005
[112] IBID

weapons[113]. The study links low-dose exposure to organophosphate pesticides at an early age to the development of ADHD[114].

Cancer and Cancer Clusters - Cancer can be caused by many factors other than exposure to environmental pollutants. Cancer can result from internal factors (genetic predisposition, hormones, immune conditions), or external factors (tobacco, chemical exposure, radiation, carcinogen exposure). The discussion of cancer and cancer clusters in this chapter will relate only to those developed after exposure to carcinogens in the environment. Cancer is defined as abnormal and uncontrolled cell growth and reproduction. This uncontrolled growth stems from damage to the DNA of a cell, which causes mutations to the genes that control cell division. These cancer cells are able to invade neighboring tissues or metastasize (travel) to different locations in the body. The CDC defines cancer clusters as a greater-than-expected number of cancer cases that occur within a group of people in a geographic are over a period of time[115]. In the United States cancer is relatively common, as 1 in 3 people will develop the disease in their lifetime[116]. Cancer can result in pain, suffering, decreased quality of life, expensive medical expenditures, and death.

A carcinogen is any substance that promotes cancer. Carcinogens can come from natural sources like aristolochia and bracken plants or the *Aspergillus Flavus* fungus. Some examples of anthropogenic pollution sources of carcinogens include; some pesticides such as DDT, benzene, dioxins, PAHs, PCBs, arsenic, kepone, EDB, asbestos, industrial smoke, vinyl chloride and the increased cancer risks associated from living near a hazardous waste facilities or nuclear power plants. The American Cancer Society (ACS) states that broadly defined environmental factors cause an estimated three-quarters of all cancer deaths in the U.S.[117] However, the ACS defines environmental risk factors as smoking, diet, infectious disease, chemical exposure, radiation, obesity, lack of exercise, and exposure to ambient pollution. The ACS believes that tobacco use, obesity, and physical inactivity have a greater effect on cancer risk than exposure to trace level pollutants in food, air, and water[118]. While low-dose exposures may present a small risk to individuals, negative health outcomes can still occur as that exposure spreads across an entire population[119]. The Agency for Toxic Substances and Disease Registry states that environmental exposure 'might raise your risk' for developing prostate, stomach, oral/pharynx, liver, esophagus, and nasopharynx cancer. Environmental exposure 'somewhat raises your risk' of developing lung, bladder and thyroid cancer[120].

Most sources of reliable information regarding cancer risks from environmental pollution state that research is ongoing, but the risks seem minimal because

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[113] Brower V, "Looking for the Trigger – The environmental genome project to uncover interactions of genes and the environment in disease", EMBO Reports, Vol. 4, No. 5, 2003, pp 452-454
[114] IBID
[115] The CDC Website – About Cancer Clusters, located at http://www.cdc.gov/nceh/clusters/about_clusters.htm accessed on March 8, 2006
[116] IBID, CDC Website
[117] American Cancer Society Website – Cancer Facts and Figures 2005, p.47, located at http://www.cancer.org/downloads/STT/CAFF2005f4PWSecured.pdf accessed on March 8, 2006
[118] IBID, ACS Website, p.47
[119] IBID, ACS Website, p.47
[120] Agency for Toxic Substances and Disease Registry Website – Cancer Fact Sheet, located at http://www.atsdr.cdc.gov/COM/cancer-fs.html accessed on March 8, 2006

concentrations are low and exposure is not prolonged. Proving causal relationships between prolonged low-level exposure and cancer development is difficult because cancer has a 10-year latency period. To compound the problem, most of what the scientific community knows about cancer and chemical exposure comes from either observations of prolonged exposure to high levels of carcinogenic chemicals in occupational settings, laboratory testing of human cells, or through laboratory animal testing[121]. Assessing the risks of prolonged low-level exposure to environmental pollution is significantly harder to determine. The probability of negative health outcomes from ambient exposure depends on concentration of chemical, length of exposure, how many times a person is exposed, and method of exposure[122]. The scientific and regulatory community use risk assessments based on chemical potency, type of exposure and dose response to determine acceptable levels of risk for the public. Typical acceptable risk levels for a linear-dose response can be anywhere from 1 cancer in every 1 million people exposed to 1 in every 1,000 people exposed[123]. Due to significant levels of uncertainty with respect to threshold levels of carcinogens, public health officials usually recommend setting acceptable exposure levels of carcinogens up to 1,000 times lower than levels that cause cancer in lab animals[124]. There are multiple federal agencies tasked with regulating carcinogenic substances and setting acceptable exposure levels. These agencies include: the Consumer Product Safety Commission, Environmental Protection Agency, Food and Drug Administration, Occupational Safety and Health Administration, Department of Agriculture and the Agency for Toxic Substances and Disease Registry[125].

An ongoing study by the Medical College of Wisconsin believes that exposure to environmental pollutants may make existing cancers more aggressive[126]. Preliminary research in this study suggests that exposure to environmental pollutants like tobacco smoke, diesel exhaust, or pesticides can cause slow-growing prostate cancer cells to grow more rapidly. However, this data is not conclusive and the study has not been completed. A study by Ames and Gold maintains that environmental regulations aimed at decreasing miniscule levels of synthetic chemicals are too expensive and their costs outweigh their benefits[127]. These researchers believe that cancer risks of ambient environmental pollution are only hypothetical, and there is no convincing evidence that synthetic chemical pollutants are important as a cause of human cancer[128]. These researchers believe that money spent to decrease cancer through reducing ambient environmental pollution would be better spent on other initiatives[129]. According to Ames & Gold, since

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[121] IBID, ATSDR Website
[122] IBID, ATSDR Website
[123] National Institute of Environmental Health Sciences Website – Cancer and the Environment Factsheet, p.27, located at http://www.niehs.nih.gov/oc/factsheets/cancer-environment.pdf accessed on March 8, 2006
[124] IBID, NIEHS Website, p. 29
[125] IBID, NIEHS Website, p. 33
[126] HealthLink at the Medical College of Wisconsin Website – "Do Environemntal Pollutants Make Cancers More Aggressive?", Lindholm & Balla, located at http://healthlink.mcw.edu/article/925836491.html accessed on March 8, 2006
[127] Ames & Gold, "Environmental pollution, pesticides, and the prevention of cancer: misconceptions", Federation of American Societies for Experimental Biology, vol. 11, no. 13, November 1997, p1041-52 & vol. 11, no.13, December 1997, p.1330
[128] IBID, Ames & Gold
[129] IBID, Ames & Gold

the majority of cancer is related to tobacco smoke, poor diet, and obesity, funneling money into public awareness and prevention program related to these behaviors may yield more positive cancer-related health outcomes than investing in further incremental pollution prevention.

According to the National Institute for Environmental Health Sciences a cancer cluster is not present if all affected people have different forms of cancer[130]. Classifying a cancer cluster can be quite challenging. Age of affected persons, type of cancer, number of cases, average cancer rate, and their resulting statistical significance all are factors in determining a cancer cluster. Often the public perceives and reports cancers clusters more readily and more often than public health officials are able to investigate, and render decisions upon. Investigating such clusters presents many methodological difficulties including the latency period problem, limited availability of studying affected persons in the community, and the clinical non-specificity of cancer cases where no means are available to determine the cause of the specific cancer case[131]. So even if a cancer cluster is identified, public health officials might be at a loss as to finding the cause of the increased cancer prevalence.

An example of an identified cancer cluster with no known cause is a study by Kulldorff at al that suggests there are statistically higher rates of breast cancer in the Northeast United States[132]. This study examined 244 counties in 11 northeastern states and the District of Columbia from 1988 to 1992. The study concluded that there is a statistically significant and geographically broad cluster of breast cancer deaths in the New York City to Philadelphia, PA metropolitan area, resulting in a 7.4% higher mortality rate than the rest of the Northeast[133]. The study cites that hypothesized risk factors that would explain the cluster, which were not adjusted for, include age at first birth, age of menarche, age at menopause, breastfeeding, genetic mutations and environmental factors[134]. Other incidents of cancer clusters are more straightforward and positively linked with environmental pollution. An example of a straightforward cancer cluster case is the increased childhood cancer rates observed in Dover Township, New Jersey. Public health officials found a statistically significant elevation of childhood cancer rates, brain cancer and leukemia particularly, in young (mostly) female children. State officials investigated possible environmental pollution causes after residents of Dover Township complained about the drinking water quality. The township's eight drinking water wells were tested and the Parkway well was found to have high levels of styrene-acrylonitrile trimer. This well originated at the Reich Farm site, where in 1971 over 4,500 drums of chemical waste was illegally dumped. Subsequent investigations led to the closing of several private and public drinking water wells and the establishment of additional municipal water treatment facilities. The Ciba-Geigy Corporation (once Tom's River Chemical) began dumping solid and liquid wastes in 20 locations on their

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[130] National Institute of Environmental Health Sciences Website – Cancer Clusters A to Z by Patricia Braus, located at http://www-apps.niehs.nih.gov/outreach%2Deducation/Documents/an0551-0600/AN000553a.pdf accessed on March 8, 2006

[131] C.W. Heath Jr., "Investigating causation in cancer clusters", Radiation and Environmental Biophysics, vol. 35, no. 3, August 1996, p.133-136

[132] Kulldorff M. et al, "Breast Cancer Clusters in the Northeast Unites States: A Geographic Analysis", American Journal of Epidemiology, Vol. 146, No.2, 1997, p.161-170

[133] IBID, Kulldorff et al

[134] IBID, Kulldorff et al

property in 1952. This resulted in groundwater and soil contamination. Ciba-Geigy also emitted several chemical pollutants in the air as a result of its manufacturing processes. The Dover Township Municipal landfill was also examined and found to be leaching lead and volatile organic compounds into private wells neighboring the landfill and wells located up to a mile east of the landfill. The state's epidemiologic study of the cancer clusters concluded that prenatal exposure to two environmental factors caused the increased incidence of leukemia in females. These two factors were contaminated drinking water from the Parkway well and air pollutant emissions from the Ciba-Geigy chemical plant[135].

Endocrine Disruption - Endocrine Disruptors are anthropogenic chemicals that disrupt the normal functioning of human (and animal) endocrine systems. Endocrine systems are responsible for regulating mood, growth and development, tissue function, metabolism, sexual function, and reproductive processes. The foundations of the endocrine system are hormones and glands. Endocrine disruptors are thought to mimic natural body hormones, inhibit the actions of natural body hormones and/or, alter the normal regulatory function of the immune, nervous, and endocrine systems[136]. Susceptible populations are thought to be young children, persons living near hazardous waste sites, subsistence anglers, American Indians, pregnant women, men and women of reproductive age, the elderly, and the urban poor[137].

The main chemicals that have been proven to disrupt endocrine functioning in wildlife are organophosphates, PCBs, dioxins, as well as synthetic and plant derived estrogens[138]. The adverse health effects exhibited in wildlife include: abnormal thyroid function, decreased fertility, decreased survival rates of offspring, and alteration of the immune and behavioral functions[139]. While there have been no formal studies that have proven the relationship between ambient exposure to chemicals and endocrine disruption, the subject has not been thoroughly studied or proven to be false. The last four decades have seen global reductions in sperm production quality and quantity, and an increase in certain cancers (breast, testes, prostate), both of which could be attributed to endocrine disruptors[140]. Exposure to such contaminants is especially dangerous during prenatal periods when the fetus is developing, affects of such exposure could manifest much later in life. The potential for a synergistic effect from the existence of multiple ambient contaminants is also possible.

Endocrine disruptors, and other ambient environmental exposure and pollution-related diseases, place many challenges on scientists with respect to proving causal relationships. Low-level doses of contaminates over long periods of time, such as the case with endocrine disruptor exposure in the environment, are very hard to mimic in

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[135] Information about the Dover Township cancer cluster can be found at the New Jersey State Website located at http://www.state.nj.us/health/eoh/hhazweb/dovertwp.htm#Summary

[136] Crisp TM, Clegg ED, Cooper RL, Wood WP, Anderson DG, Baetcke KP, et al. 1998. "Environmental endocrine disruption: an effects assessment and analysis", Environmental Health Perspectives, 1999, Vol.106, Supplement 1, p.11-56

[137] ATSDR Website - Richardson S, "Endocrine Disruption: Is There a Cause for Concern?" – located at http://www.atsdr.cdc.gov/HEC/HSPH/v12n2-2.html#1 - accessed on December 13, 2005

[138] EPA Website – Endocrine Factsheet – located at http://www.epa.gov/endocrine/edrifact.html accessed on December 13, 2005

[139] OPCIT - ATSDR Website - Richardson S, "Endocrine Disruption: Is There a Cause for Concern?"

[140] IBID

laboratory settings. Frequently, scientists use high-levels of contaminants over short time periods to ascertain the effects of chemical exposures on animal subjects. This results in gaps between high level/low level dose, short-term/long-term exposure, and animal/human response differences. Identifying information regarding the transport, fate and bioavailability of chemicals released into the environment is a task almost impossible to complete since the earth is such a large and open system with respect to environmental pollution[141].

The US EPA sponsored a workshop in April of 1995 to assess the scientific community's views on the endocrine disruptor hypothesis, identify research gaps, and prioritize future research initiatives. The group felt that the hypothesis warranted a concerted research effort to determine validity, effects on development of reproductive capability, improved exposure assessment, and on the effects of mixtures[142].

Parkinson's Disease – Parkinson's Disease (PD) is a nervous system disorder caused by the interaction of three events, 1) and individual's genetic susceptibility, 2) environmental risk factors, and 3) age. Symptoms of PD are; tremor or trembling in the hands, arms, legs, jaw, and face, rigidity or stiffness of the limbs and trunk, bradykinesia or slowness of movement, and postural instability or impaired balance and coordination[143]. Almost 50,000 Americans are diagnosed with PD each year, with the bulk of cases being diagnosed after age 50. PD is the second most prevalent neurodegenerative disorder after Alzheimer's disease[144].

Rural living has been shown to increase the relative risk of developing PD, due to pesticide use in the agricultural industry. Various pesticides and herbicides residues have been found in the brains of patients with PD that have been absent in control groups[145]. The most convincing evidence linking environmental exposure to PD development is that inadvertent exposure to MPTP (a neurotoxin and drug additive) can induce parkinsonism in humans within 7-14 days[146].

Exposure to herbicides, pesticides, heavy metals, and solvents have all been linked to PD, with compound exposures, such as found in real world scenarios, being particularly associated with PD development[147]. Again, as with the other diseases discussed in this paper, the role of underlying genetics and interplay with environmental factors combine to form disease.

Methemoglobinemia – Methemoglobinemia (MG) is a condition in which the iron in the hemoglobin molecule is defective, rendering it incapable of carrying oxygen to the tissues. MG can be inherited or acquired through exposure to certain chemicals, which cause methemoglobin production to increase. These chemicals include nitrates

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[141] Cooper & Kavlock, "Endocrine disruptors and reproductive development: a weight-of-evidence overview", Journal of Endocrinology, Vol. 152, Issue 2, 1997, p159-166

[142] Kavlock et al, "Research Needs for the Risk Assessment of Health and Environmental Effects of Endocrine Disruptors: A Report of the U.S.EPA-sponsored Workshop", Environmental Health Perspectives, Vol. 104 Supplement 4, August 1996

[143] National Institute of Environmental Health Sciences Website – "The Role of the environment in Parkinson's Disease" located at http://www.niehs.nih.gov/oc/factsheets/parkinson/home.htm accessed on December 14, 2005

[144] IBID

[145] Warner & Schapira, "Genetic and Environmental Factors in the Cause of Parkinson's Disease", Annals of Neurology, Vol. 53, Supplement 3, 2003, p. S16-S25

[146] IBID

[147] OPCIT - National Institute of Environmental Health Sciences Website

(used as additives to prevent meat from spoiling), nitrate-containing water, anesthetics such as benzocaine and xylocaine, some antibiotics (dapsone and chloroquine), and benzene[148]. MG can require treatment in severe cases, or go untreated in milder instances.

Symptoms of chemical or drug induced MG are headache, fatigue, shortness of breath, lack of energy, and potentially shock, seizure, or death. Most cases of MG or 'blue baby syndrome' have focused on the affects of nitrate-contaminated drinking water ingested by infants. Infants under 6 months of age are particularly susceptible to MG because they have low amounts of the NADH-cytochrome b_5 reductase enzyme, which allows methemoglobin to be converted back to hemoglobin. At 6 months of age infants begin to produce higher levels of this enzyme[149]. The scientific community is currently unsure whether external environmental factors, internal biological responses or multiple cofactors are responsible for cases of non-genetic MG. More research is needed to determine the causes and prevalence of this condition.

Atherosclerosis– A recent study published in the Journal of the American Medical Association links inhaled particulate matter exposure in urban areas to susceptibility to cardiovascular events[150]. This study involved subjecting laboratory mice to long-term, low concentrations of particulate matter ($PM_{2.5}$), with resulting affects including altered vasomotor tone (alters the ability of the artery to expand and contract), induced vascular inflammation (causes small tears in and on the artery walls) and increases the likelihood of atherosclerosis[151]. While this study involves laboratory experimentation on animal subjects, not observed trends in human subjects, the study is very relevant for a 2 reasons. First, most animal studies subject creatures to high doses over short time periods to induce a response. However, this study used real world $PM_{2.5}$ concentrations as found in ambient air in a Manhattan New York suburb, Tuxedo, NY. The study was also conducted over a long time period, with lab mice being exposed to air pollution for 6 hours a day, 5 days a week over a 6 month time period. When normalized over a 24 hour, 7-day period, the exposure of the mice is well within the range of $PM_{2.5}$ that people in urban areas, such as New York City, are exposed to. Secondly, heart disease and stroke, both which can be attributed to atherosclerosis are the first and third leading causes of death in America, respectively.

Artherosclerosis is the process in which fatty substances, cholesterol, cellular waste products, calcium and other substances build up a thick paste on the wall of the arteries. This paste, or plaque, can harden the arteries later in life and restrict blood flow, but the real danger comes when the plaque weakens and breaks off. Portions of the plaque that break off will travel through the bloodstream and can block a blood vessel that feeds the heart, causing a heart attack. The pieces of plaque could also block a blood vessel that feeds the brain, causing a stroke. Plaque the blocks blood vessels feeding the

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[148] National Library of Medicine Website – located at http://www.nlm.nih.gov/medlineplus/ency/article/000562.htm accessed on December 13, 2005

[149] Avery AA, "Infantile Methemoglobinemia: Reexamining the Role of Drinking Water Nitrates", Environmental Health Perspectives, Vol. 107, No. 7, July 1999

[150] Sun et al, "Long-term Air Pollution Exposure and Acceleration of Atherosclerosis and Vascular Inflammation in an Animal Model", Journal of the American Medical Association, Vol. 294, No. 23 December 21, 2005, p. 3003-3010

[151] IBID, Sun et al,

arms or legs can cause difficulty walking and eventually turn the limbs gangrene[152]. According to 2002 data from the CDC, the leading cause of death in America was attributed to heart disease (696,947 deaths) and the third leading cause of death is by cerebrovascular disease, known commonly as stroke (162,672 deaths)[153]. Particulate matter $_{2.5}$ brushes up against arterial walls, causing small abrasions, the mechanism of inflammation is akin to how low-density cholesterol affects arterial walls. These small abrasions make it easier for fatty substances in the blood stream to attach to arterial walls. The plaque builds up and alters the ability of the arteries to expand and contract. This plaque buildup and arterial wall hardening, caused by repeated exposure to particulate matter, increases the risk of heart attack or stroke.

"Airborne particulate matter demonstrates an incremental capacity to penetrate to the most distal airway units and potentially the systematic circulation with diminishing size down to 0.5μm. Particles less than 2.5μm ($PM_{2.5}$) have been linked most strongly with cardiovascular disease and are primarily derived from stationary and traffic-related combustion sources.[154]" Important to note about this study is that the $PM_{2.5}$ concentrations were within the range of concentrations exhibited in many large metropolitan areas in the United States. These concentrations are well within the present day National Ambient Air Quality Standards (<65μg/m^3) and close to the annual average of 15 μg/m^3). This suggests that repeated periods of short-term (several hours) exposure to high level particulate matter (as would be the case in rush hour traffic) is capable of promoting the progression of atherosclerosis, even though the particulate matter concentration levels are within national recommendations[155]. This fact has important implications for the relevance of federal emissions regulations, particularly the National Ambient Air Quality Standards. The evidence provided in the Sun et al study raises important questions about the levels at which the government has set their standards to, and what, if any stricter levels are required to protect human health.

Costs Associated With Disease

Diseases, no matter what the cause, come with certain costs. These costs can come in the form of expensive medical bills, expenditures for long-term care for those who are disabled, lost wages, pain and suffering of the patient, and emotional stress of the patient's family. A survey by Landrigan et al estimates the total annual cost for four environmentally related illnesses in children; lead poisoning, asthma, cancer, and neurobehavioral disorders. The study also establishes Environmentally Attributable Fractions (EAF), defined as the percentage of particular disease category that would be eliminated if environmental risk factors were reduced to their lowest feasible levels. Landrigan et al estimate that the total annual cost for these four environmentally related diseases are approximately $54.9 billion (a range between $48.8 and 64.8 billion); $43.4 billion for lead poisoning, $2 billion for asthma, $0.3 billion for childhood cancer, and

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[152] American Heart Association Website – Atherosclerosis FAQ – located at http://www.americanheart.org/presenter.jhtml?identifier=4440 accessed on January 17, 2006

[153] CDC Website – National Center for Health Statistics – Located at http://www.cdc.gov/nchs/fastats/deaths.htm accessed on January 17, 2006

[154] Sun et al, "Long-term Air Pollution Exposure and Acceleration of Atherosclerosis and Vascular Inflammation in an Animal Model", Journal of the American Medical Association, Vol. 294, No. 23 December 21, 2005, p. 3003

[155] IBID, p. 3010

$9.2 billion for neurobehavioral disorders[156]. This amount translates into about 2.8% of total annual U.S. health care costs, for only these four diseases[157]. These cost estimates are probably low due to several factors. The cost estimates only consider 4 types of environmentally related diseases, they incorporate conservative assumptions, ignore the costs of pain and suffering, do not include late complications, and exclude costs associated with adult manifestations of these diseases.

To put these costs into perspective, Landrigan cites government expenditures in other areas of the economy. The cost of these 4 diseases that can be attributed to environmental factors is $54.9 billion annually, or 2.8% of the total U.S. healthcare budget. Comparatively, the annual healthcare costs attributed to motor vehicle accidents are $80.6 billion and due to stroke are $51.5 billion. The annual costs of military weapons research are $35 billion and the costs of veteran's benefits are $39 billion. In 1995 only $2 billion were spent on all research related to children, less then 3% of all federal government sponsored research for that year[158].

EAFs for lead poisoning are 100%, meaning that all cases of lead poisoning are environmentally related. 30% (a range between 10-35%) is the EAF for asthma, meaning that 30% of childhood asthma cases are environmentally related. The EAF for childhood cancer is 5% (a range between 2-10%). For neurobehavioral disorders, the EAF was 10% (a range between 5-20%)[159], though the U.S. National Academy of Sciences attributes 28% of all neurobehavioral disorders wholly or in part to environmental factors[160].

Asthma and respiratory disorders are particularly tied to environmental factors. Evidence of this comes from a study by Ostro and Chestnut, who estimate that reduction in fine particulate matter (<2.5μm; $PM_{2.5}$) air pollution in the United States would reduce the costs of asthma and other respiratory diseases across all age groups by between $14 billion and $55 billion annually, with a mean estimate of $32 billion[161]. Not only are asthma occurrences proven to be linked to environmental factors, the prevalence of asthma seems to be rising, bringing added costs to society. A study by Chestnut et al estimated the national cost of asthma for the year 1997. This study showed that the 1997 annual costs of asthma across the United States, for all age groups were approximately $10-$11 billion[162]. This total cost was about double the estimates for the 1980's. The $10-$11 billion breaks down as such; 65% for direct medical expenditures, 20% for indirect morbidity costs, and 15% for mortality costs. About one-third of the total 1997 costs, or $3.4 billion, are attributable to asthma in children less than 18 years of age[163].

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[156] Landrigan at al, "Environmental Pollutants and Disease in American Children: Estimates of Morbidity, Mortality, and Costs for Lead Poisoning, Asthma, Cancer, and Developmental Disabilities", Environmental Health Perspectives, Vol. 110, No. 7, July 2002, p. 721
[157] IBID, p.721
[158] IBID, p727
[159] IBID, p. 721
[160] National Academy of Sciences Committee on Developmental Toxicology. Scientific Frontiers in Developmental Toxicology and Risk Assessment, Washington, DC, National Academy Press, 2000
[161] Ostro & Chestnut, "Assessing the Health Benefits of Reducing Particulate Matter Air Pollution in the United States", Environmental Research, Vol. 76, 1998, p.94-106
[162] Chestnut LG, Mills DM, Agras J. National Costs of Asthma for 1997. (EPA Contract 68-W6-0055) Boulder, CO: Stratus Consulting Inc., 2000
[163] IBID

In 2004, prescription drugs represented the largest single direct medical expenditure at $5 billion, while lost productivity due to death costs about $1.7 billion[164].

Some of these asthma related costs are incurred because more care is required, as more of the population gets sick. The Mannino et al.'s 'Surveillance of Asthma' illustrates this; between 1979-1980 and 1993-1994, the estimated national number of asthma related hospitalizations increased from 386,000 to 466,000, from 1975 to 1993-1995, the number of office visits for asthma more than doubled from 4.6 million to 10.4 million, and in 1995 there were an estimated >1.8million emergency room visits for asthma[165].

However, as the number of asthma cases in the population increases and more care is required, the average per capita cost of treating these asthma sufferers has decreased, in real terms (when accounting for inflation in the medical price index)[166]. Utilization of medical care has increased, due to rapidly rising rates of incidence of the disease. However, the technology and management of the disease has improved and become more cost efficient. This decrease in cost is also attributable to the fact that prescription medication, not expensive hospitalization or emergency care, is being heavily relied upon to control asthma symptoms[167]. A study by Chestnut, Mills, and Agras shows,

> "…that the financial burden of treating asthma falls more directly on the patients and their families, with out-of-pocket expenses estimated at roughly 25% of total medical costs, compared to 10% for medical expenses for all illnesses. This difference is attributed largely to less coverage for asthma-related expenses by Medicare, reflecting its general low coverage for prescription medications, which represent the largest category of asthma-related expenses, and the younger ages typical of asthma patients relative to other common illnesses."[168]

Thus, the burden of the 70% increase in asthma from 1985-1996 is falling on the shoulders of those who are afflicted, most notably, the younger population.

Caring for individuals with developmental disabilities over the course of their lifetime creates an excessive financial burden on families, the government and taxpayers. One study shows the average annual out-of-pocket, non-reimbursed expenses paid by the family of an adult living with mental retardation is about $6,348. The average annual income of the corresponding household would be around $37,657[169]. This works out to be about 17% of annual income, with the percentage rising as the family's income level declines.

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[164] American Lung Association Website – Epidemiology & Statistics Unit Research and Program Services, "Trends in Asthma Morbidity and Mortality", May 2005 – Located at http://www.lungusa.org/atf/cf/%7B7A8D42C2-FCCA-4604-8ADE-7F5D5E762256%7D/ASTHMA1.PDF - accessed on December 12, 2005

[165] Mannino et al., "Surveillance for Asthma – United States, 1960-1995" CDC's Morbidity and Mortality Weekly Report, Volume 47 (SS-1), April 24, 1998, p. 1-28

[166] Chestnut LG, Mills DM, Agras J. National Costs of Asthma for 1997. (EPA Contract 68-W6-0055) Boulder, CO: Stratus Consulting Inc., 2000

[167] IBID

[168] IBID

[169] Fujiura & Roccoforte, "Costs of family care for adults with mental retardation and related developmental disabilities", American Journal of Mental Retardation, Nov. 99 1994 vol. 3. p. 250-61

The Autism Society of America displays some interesting numbers regarding autism costs and prevalence. They claim that autism is growing at rate of 10-17% per year, with a $90 billion dollar annual cost[170]. Growth rates for the 1990's show that the U.S. population increased by 13%, disabilities increase by 12% and autism increased by 172%, numbers which are referenced from the U.S. Department of Education's "Twenty-First Annual Report to Congress on the Implementation of the Individuals with Disabilities Education Act" (1999)[171]. The website claims that in 10 years the annual cost of autism to society will be $200-400 billion, thought they give no method of how this calculation was reached[172].

The cost of cancer care in the United States is estimated to be about $96 billion per year[173]. The majority of these costs are attributed to cancer cases that are not related to environmental pollution. One study estimates that the cost to society of EPA environmental regulations is about $140 billion per year[174]. Some of those regulation dollars go to preventing the release of carcinogens into the environment, thus reducing cancer rates. Estimated costs directly associated with cancer caused by environmental pollution were unable to be obtained. Between 1995 and 2004 the overall costs of treating cancer increased by 75% and these costs are expected to continue to increase as the population ages[175]. The total economic burden associated with cancer, which includes costs of care and indirect costs such as loss of time and economic productivity, is estimated to be about $190 billion in 2004[176].

The estimated educational costs of ADHD are about $3.5-4 billion annually[177]. The average Medicaid reimbursements for total treatment costs of a child with ADHD are $1,795 annually (compared to $1,666 for a child with asthma)[178]. Though, the highest costs seem to be borne by the families of and individuals who have the disease. Quantifying these costs are very difficult and I could find no information about them. It is noteworthy to mention that the lack of insurance coverage, preventing the appropriate diagnosis and treatment of ADHD, and the lack of integration with educational services are substantial barriers to care and represent considerable long-term costs for society[179]

The burden of Parkinson's Disease lies heavily on society, families and the individual. One study estimates the per capita societal burden to be $6,000 per year, most

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[170] The Autism Society of America Website – Autism Facts Sheet located at - http://www.autism-society.org/site/PageServer?pagename=Autism_Facts accessed on December 14, 2005

[171] IBID

[172] IBID

[173] Schuette et al, "The costs of cancer care in the United States: implications for action" Oncology (Williston Park), Nov 9, 1995, Suppl. 11, p19-22

[174] Ames & Gold, "Environmental pollution, pesticides, and the prevention of cancer: misconceptions", Federation of American Societies for Experimental Biology, vol. 11, no. 13, November 1997, p1041-52 & vol. 11, no.13, December 1997, p.1330

[175] National Cancer Institute Website – Cancer Trends Progress Report – 2005 Update, located at http://progressreport.cancer.gov/doc_detail.asp?pid=1&did=2005&chid=25&coid=226&mid= accessed on March 8, 2006

[176] IBID, NCI Website

[177] CDC Website – "Public Health Issues in ADHD: Individual, System, and Cost Burden of the Disorder Workshop" located at http://www.cdc.gov/ncbddd/adhd/dadburden.htm accessed on December 14, 2005

[178] IBID

[179] 'National Institutes of Health Consensus Development Conference Statement: Diagnosis and Treatment of Attention-Deficit/Hyperactivity Disorder (ADHD)', Journal of the American Academy of Child & Adolescent Psychiatry, Vol. 39, N0.2, February 2000, p. 182-193

of which was compensation for lost earning to people under the age of 65[180]. However, the same study noted that the direct costs of the disease are far lower than the hidden cost, which include; lost wages, informal care, and the psychological affects of changing roles[181]. Another study by Scheife et al estimates the total national cost of PD at $25 billion per year[182]. The same study suggests that the government, with respect to medication, treatment, healthcare resources, and research of PD, should seek new methods of allocative efficiency.

Atherosclerosis costs can be estimated by looking at the annual cost of heart disease or stroke in the United States. One study estimates that 60 million Americans have one or more types of heart disease and that the total annual cost of coronary heart disease is estimated at $95 billion[183]. Another study suggests that hospitalization costs and lost labor wages resulting from heart attack or stroke cost the U.S. $13 billion annually for first time sufferers. For repeated heart attack or stroke victims, the cost increases another $13 billion annually. Estimates from the same study suggest that overall direct and indirect costs of stroke are about $53.6 billion a year[184]. Costs from side effects of stroke suggests that patients with secondary diagnosis of syncope - passing out or fainting due to temporary insufficient blood flow to the brain - due to atherosclerosis, incur annual costs of $6,820[185]. Yet another study estimates that cardiovascular disease, heart attack and/or stroke, cost the U.S. $393.5 billion in 2005[186]. These estimates vary widely, but all estimates are significant. Lowering the risk of atherosclerosis by reducing particulate matter could yield economic gains in the form of reduced healthcare costs and improved quality of life for many Americans.

No cost estimates could be located for endocrine disruptors or methemoglobinemia.

The population of the United States is expected to age rapidly over the next half a century as the baby boomers mature. The EPA expects a five-fold increase in the number of elderly citizens in the United States from 2000 to 2050[187]. Due to the increasing number of older Americans, and their sensitivity to environmental pollution, environmental health effects upon the older population has become an increasingly important public health concern[188]. The EPA identified six key conditions affecting those

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[180] Whetten-Goldstein et al, "The Burden of Parkinson's Disease on society, family, and the Individual", Journal of the American Geriatric Society, Vol. 45, No 7, July 1997, p844-9

[181] IBID

[182] Scheife et al, "Impact of Parkinson's disease and its pharmacologic treatment on quality of life and economic outcomes", American Journal of Health-System Pharmacy, Vol. 57, Issue 10, 2000, p953-962

[183] Gonzalez and Kannewurf, "Atherosclerosis: a unifying disorder with diverse manifestations", American Journal of Health-System Pharmacists, Vol 55, Issue Suppl_1, s4-s7

[184] American Heart Association Website – "Ignored cardiovascular risk factors costs billions" located at http://www.americanheart.org/presenter.jhtml?identifier=3024569 accessed on January 18, 2006

[185] Nyman et al, "The cost of recurrent syncope of unknown origin in elderly patients", Pacing Clinical Electrophysiology, Sept 1999, Vol. 22, No.9, p.1386-94

[186] Nordlie, Wold & Kloner, "Genetic contributors towards increased risk for ischemic heart disease" Journal of Molecular and Cellular Cardiology, Vol. 39, Issue 4, Oct 2005, p. 667-679

[187] US EPA Website – "Cost of Illness for Environmentally Related Health Effects in Older Americans", located at http://www.epa.gov/aging/resources/coi/2005_04_coi_older_am_dr_01title.pdf , April 2005 accessed on March 14, 2006

[188] US EPA Website – "Cost of Illness for Environmentally Related Health Effects in Older Americans", located at http://www.epa.gov/aging/resources/coi/2005_04_coi_older_am_dr_01title.pdf accessed on March 9, 2006

over 65 years of age, which were related to environmental exposures. Chronic lung disease and ischemic heart disease are most prevalent in older populations, affecting 10% to 20% of those over 65 and imposing costs of $35 billion in 2000[189]. Between 5 to 10% of elderly suffer from stroke and pneumonia, which cost about $10-$20 billion in 2000[190]. About 1% of the elderly are affected by lung cancer, which cost about $4.5 billion in 2000[191]. Gastrointestinal illnesses were found to affect 2%-3% of the elderly population, which translated into a $1 billion cost in 2000[192]. There are several disclaimers to this study. The most mentionable being that these cost should not be interpreted as specifically related to environmental exposures. This is because there is not enough scientific and empirical data to prove such relationships. Therefore the EPA claims that these costs represent upper-bound estimates of environmentally related costs of illnesses.

Regulatory Fragmentation

The Toxic Substances Control Act (TSCA) of 1976 authorizes the EPA to secure information on all new and existing chemical substances and to control any of these substances that could cause unreasonable risk to public health or the environment. The TSCA provides the framework for the U.S. Chemical Policy[193]. In addition the Pollution Prevention Act (PPA) of 1990 guides U.S. national policy to recognize that,

> "pollution should be prevented or reduced at the source whenever feasible; pollution that cannot be prevented should be recycled in an environmentally sound manner, whenever feasible; pollution that cannot be prevented or recycled should be treated in an environmentally sound manner whenever feasible; and disposal or other release into the environment should be employed only as a last resort and should be conducted in an environmentally safe manner."[194]

The EPA's Office of Pollution Prevention and Toxics (OPPT) has been tasked with administering the TSCA and PPA as well as managing the Chemical Right-to-Know Initiative and various new and existing chemical control programs such as the Design for the Environment, Green Chemistry, Environmentally Preferred Products and the Lead, Asbestos, and PCB programs[195]. The EPA and Vice President Gore introduced the "Chemical Right-to-Know Initiative" in 1998 to provide public access to basic hazard information on 23 high production volume chemicals, risk assessments that certain chemicals present to children, and to improve the reporting of the releases of chemicals that are persistent, toxic, and bioaccumulative[196]. The Chemical Right-to-Know Initiative (CRK) included the Voluntary Children's Chemical Evaluation Program, which is intended to provide the public with data to help them understand the health risks to

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[189] IBID, EPA Website
[190] IBID, EPA Website
[191] IBID, EPA Website
[192] IBID, EPA Website
[193] U.S. Department of the Interior Website – Toxic Substances Control Act, located at http://www.eh.doe.gov/oepa/laws/tsca.html accessed on November 27, 2005
[194] U.S. Department of the Interior Website – Pollution Prevention Act located at http://www.eh.doe.gov/oepa/laws/ppa.html accessed on November 27, 2005
[195] EPA Website – Office of Pollution Prevention and Toxics located at http://www.epa.gov/oppt/ accessed on November 27, 2005
[196] EPA Website – Chemical Right-to-Know Initiative, located at http://www.epa.gov/chemrtk/ accessed on November 27, 2005

children associated with specific chemical exposures. In fact there are a multitude of regulatory programs designed to monitor, research, and assess industrial chemicals. The CRK represents a valuable effort, but it is a voluntary program that only addresses 23 high production chemicals, when there are over 3,000 chemicals produced or imported in quantities of over 1 million pounds per year[197].

While a complete analysis of these programs is beyond the scope of this chapter it is important to note some flaws pointed out by industry professionals. Researchers from the University of Massachusetts argue that,

> "there is truly no one U.S. chemicals policy, but rather a series of different un-integrated policies at the federal, regional, state and local levels. While the centerpiece U.S. Chemicals Policy, the Toxic Substances Control Act of 1976, has resulted in the development of a comprehensive, efficient rapid screening process for new chemicals, agency action to manage existing chemicals has been very limited. The agency, however, has engaged in a number of successful, though highly under funded, voluntary data collection, pollution prevention, and sustainable design programs that have been important motivators for sustainable chemistry.[198]"

The University of Massachusetts researchers go on to indicate that state level restrictions on toxic chemicals and persistent toxics have been putting pressure on the federal government to increase policy efforts towards toxic substances. The researchers conclude that the current approach of data collection regarding chemical risks and phase-outs of the most dangerous chemicals will not achieve the goal of sustainable chemistry. They recommend that U.S. chemical management concentrate on (1) the need for good information on chemicals flows, toxic risks, and safer substances; (2) the need for comprehensive planning processes for chemical substitution and reduction to avoid risk trade-offs and ensure product quality; (3) the need for technical and research support to firms for innovation in safer chemistry; and (4) the need for rapid screening processes and tools for comparison of alternative chemicals, materials, and products[199]. Among other things, these suggestions would help the federal government reduce public health risks from new and existing toxic chemicals, assist industry in developing safer substitute chemicals to further reduce health risks, aid in the research and development process of discovering sustainable chemical substitutes, and enable these safer chemicals to reach the market faster.

The European Union has proposed a plan to increase public health and environmental protection while also enhancing competitiveness and innovation in the chemicals industry. This plan is called the Registration, Evaluation, and Authorization of Chemicals (REACH) and it mandates that entities that import or manufacture more than one ton of a chemical substance per year register that substance in a central database. Database information would include hazard, use, and risk data on over 30,000 substances. These measures are expected to shift greater responsibility to the chemical industry to

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[197] Weiss & Landrigan, " The Developing Brain and the Environment: An Introduction", Environmental Health Perspectives, Volume 107, Supplement 3, June 2000

[198] Tickner, Geiser & Coffin, "The U.S. Experience in Promoting Sustainable Chemistry", Environmental Science and Pollution Research, Volume 12, Number 2, March 2005, pgs. 115-123

[199] IBID – Results and Conclusions

manage risks from chemicals and increase safety information (reversal of burden of proof). This legislation is due to take effect in 2007. This legislation was formulated as the European Union (EU) realized these key facts; 1) the number and incidents of allergies, asthma, certain cancers, and reproductive disorders are increasing in Europe and it is suspected that chemicals are affecting this trend; 2) for 99% of the chemicals used in the EU there is not enough information about effects, uses, and safe handling; 3) modern society needs chemicals[200].

The chemicals scenario in the EU is very similar to the scenario in the United States. However, the EU has a plan in place and the United States does not. The EU's REACH could have positive effects in the United States. Similar but scaled down versions of the REACH have been introduced domestically, such as the 'Child Worker and Consumer Safe Chemicals Act' and the comprehensive chemicals policy being developed for the State of California. U.S. owned multinational corporations, who must abide by EU regulations to export and manufacture products in their markets, will feel the direct effect of REACH. This could cause many multinational companies to adopt strict information policies that could benefit Americans. Many opponents of REACH suggest that the costs associated with implementing the plan will drive small businesses to bankruptcy, or even that the plan violates free trade agreements set up by the World Trade Organization. Supporters of REACH argue that the U.S. has not looked at the public health impacts of the plan, preferring to directly lobby the government to oppose and reduce the scope of REACH[201]. A study by the European Council states that over an 11-year period the direct annual costs of REACH will be about 0.06% of chemical industry sales[202]. It is estimated that the U.S. chemicals trade in the EU is worth $600 billion a year and that U.S. chemical companies have over $2.5 trillion invested in Europe[203].

An interesting development in U.S. policy towards toxic chemicals is the amending of the Federal Insecticide, Fungicide, and Rodenticide Act and the Federal Food, Drug, and Cosmetic Act by the creation of the Food Quality and Protection Act of 1996, which requires the EPA to make a finding that pesticides for food use are safe for children. The interesting part is that the law requires the EPA to incorporate a 10-fold factor in risk assessment for pesticide residue tolerance to take into account the special sensitivities of infants and children as well as incomplete data in regards to toxicity and exposures[204]. It is important because it signifies the federal government's acknowledgement that the young population is more sensitive to, and bears a larger burden from toxic chemical pollution, then the rest of the adult population. This is an important point to recognize when building public policy towards the environment, which

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[200] European Commission Website – "Environmental Fact Sheet: REACH – a new chemicals policy for the EU" located at http://europa.eu.int/comm/environment/chemicals/pdf/fact_sheet_reach.pdf accessed on March 19, 2006

[201] Environmental Science and Technology Online – "U.S. companies get nervous about EU's REACH", January 5th 2005, located at http://pubs.acs.org/subscribe/journals/esthag-w/2005/jan/policy/pt_nervous.html accessed on March 19, 2006

[202] IBID, EST Online

[203] IBID, EST Online

[204] Goldman & Kuduru, " Chemicals in the environment and developmental toxicity to children: a public health and policy perspective", Environmental Health Perspectives, Jun 2000, vol. 108 Supplement 3, pg. 443-8

is usually based on risk to the general public. Other then the FQPA, the main methods used to create chemical policy such as risk assessment, risk management, and risk characterization, do not consider the distinct sensitivities of children to pesticides and toxic chemicals[205]. Instead, they use adults as their point of reference and do not consider the increased biological susceptibility of children in their models of risk assessment[206]. The benefits to the chemical industry from inchoate regulations could directly result in disproportionate costs to the vulnerable youth of the nation. This could lead to increased healthcare and disability related financial responsibilities in the future as well as decreased educational outcomes and needless pain and suffering. For this reason it is important to note that less expensive, ineffective action to protect public health can lead to problems in the future that are more difficult and expensive to address.

To illustrate how non-comprehensive the U.S. policies towards toxic chemicals are, consider the fact that there are at least 80,000 chemicals registered with the EPA. Of these 80,000 very little information is available regarding their toxic potential. There are 3,000 chemicals produced or imported in quantities over 1 million pounds per year and of these only 43% have received even minimal toxicological assessment and only 23% have been tested to determine whether they have the potential to cause developmental damage[207]. The Toxic Substances Control Act legally mandates the testing of these commercial chemicals, however there are inadequacies in the testing requirements under the TSCA. For instance, toxic compounds in use before the introduction of the TSCA are not tested and there are no current requirements to do back testing (unless an older chemical has to be reregistered)[208]. In light of the EU's REACH plan to address the problem of the chemical industry's impact on public health, it may be more expensive for the U.S. not to act then to create a similarly comprehensive domestic plan.

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[205] Landrigan & Carlson," Environmental Policy and Children's Health", The Future of Children, Vol. 5, No. 2, Summer/Fall 1995, p.6
[206] IBID
[207] Weiss & Landrigan, " The Developing Brain and the Environment: An Introduction", Environmental Health Perspectives, Volume 107, Supplement 3, June 2000
[208] Landrigan & Carlson," Environmental Policy and Children's Health", The Future of Children, Vol. 5, No. 2, Summer/Fall 1995, p.6

Existing Environmental Regulations

Licensing laws

The *Federal Food, Drug, and Cosmetic Act (FFDCA)* controls levels of environmental contaminants as well as substances added to and naturally occurring in food, drugs, and cosmetics. It also provides for the setting and enforcement of tolerances on pesticide residues for food and feed crops, regulates introduction of new drugs and biologics, and requires cosmetics to be labeled.

The *Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)* provides for the registration of pesticides with the Environmental Protection Agency. It requires that pesticides not cause unreasonable risk of injury to human health or the environment.

The *Toxic Substances Control Act* requires testing of existing chemicals where data are inadequate to assess risk of injury to human health or the environment. It also prohibits the introduction of new chemicals that present an unreasonable risk and restricts or prevents the production, use, or disposal of existing chemicals that present unreasonable risk.

Standard-setting laws

The *Clean Air Act* sets standards for air quality, vehicle emissions, fuels, and fuel additives. It also requires the EPA to regulate emissions of hazardous air pollutants and to conduct research on air pollution.

The *Clean Water Act* sets maximum contaminant levels (MCLs) and maximum contaminant level goals (MCLGs) for public drinking water supplies. The MCLGs do not consider feasibility, but MCLs do.

The *Consumer Product Safety Act* promulgates consumer safety standards, balancing risks against the cost, utility, and availability of the product.

The *Federal Hazardous Substances Act* bans hazardous substances that may cause substantial personal injury or illness from use in households.

The *Occupational Safety and Health Act* sets standards for contaminants in the workplace which may cause a "material impairment of health or functional capacity." The act attempts to attain the highest possible degree of occupational health and safety protection.

Control-oriented laws

The *Comprehensive Environmental Response, Compensation, and Liability Act* along with the *Superfund Amendments and Reauthorization Act* funds cleanup of hazardous waste sites, designates reportable quantities of toxins for environmental release, reports on community preparedness and release, and mandates the EPA to prepare toxicity profiles on contaminants. These acts focus on the highest risk chemicals, where there is "substantial danger to the public health or welfare."

The *Lead-based Paint Poisoning Prevention Act* mandates the Consumer Product Safety Commission to determine, if possible, a safe level of lead in paint to prevent the poisoning of children by lead-based paint.

The *Poison Prevention Packaging Act* promulgates standards for packaging substances that could produce serious personal injury or serious illness. The Consumer Product Safety Commission is mandated to determine the degree and nature of the hazard to children from the packaging of poisonous products.

The *Resource Conservation and Recovery Act* regulates the handling of hazardous wastes and lists hazardous wastes on the basis of their constituents in order to "protect human health [from] . . . serious irreversible or incapacitating reversible illness [and] . . . substantial present or potential hazard." The act also controls handling to minimize risks.

Source: U.S. Congress, Office of Technology Assessment. *Neurotoxicity: Identifying and controlling poisons of the nervous system.* OTA-BA-426. Washington, DC: U.S. Government Printing Office, April 1990.

Conclusion

Environmental pollution has significant impacts on human health. This is apparent through evidence linking ambient and concentrated environmental exposures to diseases in humans. These diseases can include asthma, developmental toxicity, neurotoxicity (Autism Spectrum Disorders), and developmental disabilities in children, ADHD, cancer and cancer clusters, endocrine disruptions, Parkinson's Disease, methemoglobinemia and atherosclerosis.

It is also clear that embryos, fetuses, infants, and children are consistently the most sensitive to environmental pollution. This is an important fact to consider when framing environmental regulations and assessing how to allocate resources to combat environmental health problems. It was shown that chemical exposure on a developing child can have adverse and expensive health affects on that child for the rest of its life. Legislators should be aware of this when they form regulations, since instituting seemingly expensive preventative measures in the present could curtail exorbitant costs of care, poor educational outcomes, healthcare reimbursement, and disability compensation in the future. Many of these diseases seem to be growing exponentially. The costs associated with these diseases are likely to increase at comparable rates, unless more efficient methods of care and maintenance are discovered.

The growing elderly population in America is also more susceptible to environmentally related pollution and hazards. America faces the problem of having more elderly people who will require increased amounts of medical care because of their old age and susceptibility to disease. Paying for this care will result in a substantial burden on all Americans. Environmental pollution and hazards particularly affect the elderly. Reducing environmental pollutants could have the cost saving benefit of reducing the amount of medical care required for the elderly population. In this sense, money spent to enact stricter regulations could be realized as cost savings resulting from reduced health expenditures on the federally dependent elderly.

Quality of life is another important issue to be considered. America is, arguably, the global benchmark for standard of living and quality of life. Americans tend to be risk adverse (value avoiding risks) and support environmental regulations to enhance their quality of life. America has many regulations to protect public health from pollution; however, those regulations are fragmented and not comprehensive. Industrial hegemonies exist because operations of the chemical industry directly affect the American economy through production of inputs, products, and related services. Fragmentation of regulations and the pervasiveness of the chemical industry in the American economy have led to a complex problem. Imposing stricter health-based pollution standards, guided by the precautionary principle (instead of maximum allowable levels), places limits on the industry that could negatively impact our domestic economy. The government is likely unwilling to do this because it equates standard of living and quality of life with economic stability and productiveness. This philosophy may have to change in light of diseases related to environmental pollution. The logic behind this change would come at the realization that Americans value the prevention of disease, through the strict regulation of environmental pollution, more then they value incremental increases in the productivity of the economy. While economic stability is

likely valued by all Americans, a balance between economic growth and the preservation of domestic environmental health (translating into a healthier population of humans, wildlife and plants) is probably desired by the majority of the U.S. population. It also is important to note that strict environmental regulations do not have to be mutually exclusive with economic progress and stability. What should be sought is a minimization of risk through restructuring, innovation, and substitution in the industrial chemical industry and a consolidation of regulations formulated with the precautionary principle in mind. This desire for preventative environmental health measures balanced with economic sustainability is either not supported by the government or not understood or encouraged enough by the citizens of America.

As the globalization proliferates, pollution increases. Some believe that globalization will eventually enable developing countries to enact strict environmental regulations. This could occur as economic stability and standards of living are achieved and the marginal benefits of such regulations outweigh the marginal costs of implementing them. However, in the short-term, loose environmental laws help developing countries achieve the competitive advantage that affords them economic progress. Developing countries like India and China are contributing significant amounts of pollution into the world's ecosystem. The transboundary nature of pollution dictates that pollution in other countries can migrate to America, causing negative human health outcomes. As more of the world begins to develop, pollution will become a bigger problem. Even if America enacts stricter environmental standards and regulations, negative human health impacts could still result from migrating foreign pollution. Many of the studies cited by the U.S. government state that ambient environmental pollution is not a risk to human health because the concentrations of hazardous chemicals are too low to cause harm. The common environmental catch phrase, "the solution to pollution is dilution" is echoed through the perspectives of much of these public health surveys. Eventually dilution will not be an answer. Domestically, concentrations will increase as populations grow, consumerism strengthens, and pollution is addressed in a piecemeal, maximum allowable fashion. Concentrations of pollutants will begin to exponentially increase worldwide as developing countries follow the lead of the United States and storm through their own industrial revolutions.

As the world's leader, America could set a significant precedent by enacting a constitutionally guaranteed environmental right. The value of this measure would be realized through symbolism and substance. America would be forced to invest in changing many of its environmentally irresponsible behaviors. These actions and investments could convince other countries of America's honest effort to protect the environmental and human health. Other countries may choose to follow America's progressive lead, for economic or ideological reasons, by enacting their own comprehensive environmental right. This could result in more positive human health outcomes all over the world, by reducing native and transboundary environmental pollution.

An environmental right could effectively address many of the public health concerns discussed in this chapter. There are five major ways an environmental right would address these public health concerns. First, it would force the government to adopt stricter pollution standards based on the precautionary principle and the increased sensitivity to pollutants exhibited by children, the sick, and the elderly. They would be

forced to do this because of increase liability exposure resulting from the positive and negative duties imposed on the government to provide an environmental suitable for the health and well-being of the people. Second, this environmental right would serve as a guide to all existing environmental regulations. Many existing environmental laws and regulations would have to be reworked to incorporate this new right. The result could be a comprehensive and consolidated set of environmental regulations that would curtail regulatory fragmentation and confusion. Third, this right would put more power into the hands of the citizens, environmental organizations, and the EPA. This would increase the ability of citizens, NGOs and the EPA to stop the actions of entities who pose greater risks to human health. Particularly, giving more autonomy to the EPA would allow the agency to more successful in setting and achieving goals. Fourth, this right would deter future environmentally irresponsible behavior by setting up hefty fines and sanctions for violators. Additionally it would grant pathways to legal redress for those whose rights have been violated. This measure shifts the control from the polluters to the people that are subjected to the pollution. Lastly, an environmental right would encourage stricter product testing to protect environmentally related consumer health. This is a phenomenon related to the increased level of legal liability that will be shouldered by polluters and the increased amount of power that will be placed in the hands of those subjected to pollution. In order to reduce liability and associated costs, industry and the government will test products strictly.

This right could also make investing in cleaner technologies look more attractive to industry, by signally a firm commitment to environmental protection by the government and increased public demand for environmentally friendly products. The huge industrial, governmental and consumer costs associated with implementing an environmental right could be offset by phasing this right in over a set period of time. Savings in other areas may also offset these increased costs. These areas of savings include, reduced government expenditures for environmentally related Medicare costs, decreased disability payments by the government, reduced health care related personal expenditures for environmentally related illnesses, increased productivity, lives saved, and long-term reduced liability for the chemical industry resulting from fewer hazardous substances.

A constitutionally guaranteed environmental right would not prevent all environmentally related health issues from occurring. It would reduce negative human health outcomes related to anthropogenic pollution by preventing, reducing and eliminating pollution. Though it would impose a cost burden on the domestic economy, these costs can be phased in tolerably. Moreover, these short-term costs could prevent larger long-term costs related to caring for the unhealthy population and correcting damage done to essential aspects of the environment.

An American Evolution – Government Chapter

Christina Simeone

Introduction

The government plays a pivotal role in developing, implementing and enforcing a Constitutional environmental right. In developing this right, the government must decide how to allocate resources so that increased environmental protection does not negatively impact other important social aspects of American life, such as funding for health, safety, education, disability, etc. Keeping this in mind, a healthy environment is something that is necessary for all citizens. There are no substitutes for many environmental outputs that human beings are dependent on, such as clean air and fresh water. There are extremely high costs associated with making dirty air and water suitable for human consumption. Furthermore, human actions can affect the stability of the earth's climate. This can result in enormous costs associated with increased intensity and frequency of storms, extreme temperatures, infrastructure loss, decreased crop yields, unnecessary mortality, and disruptions in marketplace activities. Lastly, the well-being of future generations should be considered when thinking about the benefits and costs of an environmental right. The failure to incur slightly higher costs in the present could result in exponentially higher costs in the future, related to decreased quality of environmental outputs and climate instability.

The phenomenon of globalization must also be considered when discussing environmental rights and the role of government. As countries like China and India struggle through their own respective industrial revolutions, worldwide pollution will increase. This is troubling because many forms of pollution are transboundary in nature, meaning that they can travel far from the location of original release. The impact of increased worldwide pollution should be impetus enough for the United States to join the rest of the developed world in increasing environmental protection efforts, but so far it has not been. Perhaps the most convincing reason to increase environmental protection in the United States may be for economic advantage. As developing countries mature and world-wide competition for resources increases, the United States may have to deal with increased energy prices in the face of limited resource supplies. Holding on to old ways of thinking, processes, procedures, and technologies that are inefficient may result in a competitive disadvantage for the United States. An environmental right may be the right incentive, substantively and symbolically, to urge consumers, businesses, industries and the government to value resource efficiency and conservation. This could provide the dual benefit of reducing pollution while also decreasing the costs associated with resources like gasoline, electricity, timber, coal, etc. This new way of thinking could afford America a competitive advantage in the global marketplace through lower resource costs, increased incentives for leadership in technology innovation, and an improved image of environmental responsibility.

This chapter will begin by illustrating the basics of the American government. A discussion will follow about environmental protection aspects of the Constitution and if there is a need for an environmental right. The next sections will examine how different branches of government influence the EPA and detail specific incidences where short-

term political agendas have undermined environmental protection. The costs of environmental regulations will then be addressed, followed by information about the possible demand for increased environmental protection in the United States. The section will end with an analysis of the roles that federal and state governments have in environmental protection and a summary conclusion.

U.S. Government Primer

The United States is governed on the principle of democracy, a form of government where the population of a society controls the government. There are various forms of democracy, namely direct and representative democracies. Direct democracy allows people to vote directly on government decisions. Direct democracy is difficult in large societies because it requires frequent organizing of the population for voting purposes. Representative democracies allow people to elect officials to vote on government decisions. The votes of these elected officials are supposed to reflect the preferences of the people who appointed them. The United States is a representative democracy. The United States is also considered a 'liberal' representative democracy because the ruling government is subject to rule of law and separation of powers. An 'illiberal' democracy puts no limits on the power of elected representatives.

The United States is a federal republic. A Federation divides power between subordinate state governments and a dominant federal government. Thus, federalism allows a good deal of autonomy to the individual states within the United States. This allows certain issues like abortion, gay marriage, gun rights, the death penalty, etc, to be dealt with on an individual states basis. Assuming no state laws conflict with federal laws, this method of government allows for greater freedom, individuality, and democracy.

The federal government has three main branches, the executive (the president), the legislative (Congress), and the judiciary (the courts). The executive branch of the government consists of the President and the Vice president as well as the Cabinet, Executive Office of the President, and various other federal executive departments. The President must take care that the laws be executed in good faith. Some of the powers of the President include; control over military personnel, managing national affairs and the workings of the government, issuing executive orders to effect internal policies, veto and approve Congressional legislation, pardon criminals convicted of federal offenses, and appoint Supreme Court justices and federal judges.

The Legislative branch consists of Congress, which is divided into two chambers, the Senate and the House of Representatives. The Senate contains two members for each state. The House of Representatives has members from each state, depending on the population of the state. One main function of Congress is monitoring and influencing the executive branch, usually through some form of oversight. Other powers of Congress include, but are not limited to; lay and collect taxes, coin money and regulate its value, make laws necessary to execute the powers of Congress, promote progress of science, creation of courts inferior to the Supreme Court, raise and support armies, declare war, exercise exclusive legislation in Washington, D.C., regulate commerce with other nations, and borrow money on the credit of the U.S. Each Congressman must

simultaneously be a legislator, politician, committee member, representative of their constituency, and servant of the constituency.

The Judicial branch of government includes the federal court system, headed by the Supreme Court and various subordinate federal courts such as the U.S. courts of appeals and U.S. district courts. Congress has authority to create and abolish federal courts, except for the Supreme Court. There are three levels of federal courts that hear both civil and criminal cases. U.S. districts courts are 'trial courts' where cases are filed and decided. U.S. court of appeals are 'appellate courts' that hear appeals from district courts and administrative agencies (like the EPA). The U.S. Supreme Court presides over cases from the appeals courts and Constitutional issues from state supreme courts. The power of the Judiciary reaches from civil actions for damages to federal criminal cases.

These three branches of government exist because of the idea of separation of powers. Separation of powers requires the division of a government's political power into branches that have unique responsibilities, powers, and duties. This serves to better organize government, but moreover it allows limits to be places on each individual branch. One branch of government can exert force or power on another branch to limit the latter's power. This is commonly known as the system of 'checks and balances', where checks implies monitoring and balances implies a limiting of power. Checks and balances serve to reduce tyranny and create a stable government.

Popular theory suggests that at any time there may be a fourth, unintended branch of government. Lobbyists, the news media, the executive bureaucracy or even the general public have been theorized to be this fourth branch of government. However, this fourth branch theory should not be taken too literally. What should be gleaned from this theory is that there are many influences that act upon the federal government. The strongest influence on a democratic government should, by definition, be the people who elect the politicians. However, it is undeniable that lobby and special interest groups influence the political process. Also, the proliferation of the executive bureaucracy has served to diffuse power among many administrative agencies that was originally reserved for the three branches of government. Bureaucracy is an administration of government through agencies or bureaus. Non-elected officials appointed by the President run these bureaus. Bureaucracies are charged with administrating and enforcing applicable laws. Again, the fourth branch of government is no more than a theoretical construct. There is no Constitutional provision that establishes it, nor can one entity be singled out as the subject of such a label. The idea of a fourth branch of government simply serves to illustrate that there are parties external to the official three branches of government that have a degree of power and can exert influence.

The U.S. Constitution and Environmental Protection

The forefathers did not foresee a Constitutional framework for environmental protection. In the absence of an amended Bill of Rights to this regard, the U.S. Constitution has not reflected the need for environmental protection. In the face of increased populations, limited land, degradation of the land, decreasing (if not dwindling) resources, increased ambient pollution in the air and water, and the resulting negative impacts on human health, the current Constitution sets up a political framework, not a

guarantee of environmental protection. This political framework, in the absence of an environmental right, focuses on managing environmental protection not insuring a basic level of environmental quality. As Karkkainen states, conventional environmental regulation has been moderately effective – though not cost-effective – in reducing emissions from point sources that are easily monitored, and less successful at controlling toxic pollutants[1]. Often, governmental methods of managing environmental problems are not based on precautionary principle (to anticipate and prevent harm) or the public trust doctrine (for the benefit of present and future generations). The U.S. Constitution is a living and dynamic tool, not static document. It is meant to evolve and change over time in order to address the problems society faces.

The U.S. Constitution has 3 main issues to address when faced with environmental protection and environmental rights issues; 1) inclusiveness of protection; 2) applicability of due process; and 3) fragmentation of political power[2]. Inclusiveness is the consideration of who is protected under the Constitution. When the Constitution was first written it began by stating, "We the People", referring to who demanded and received the rights granted in the Constitution. Amendments were later needed to include women, Native Americans, and African Americans, as the framers of the Constitution did not consider or include their rights. The rights of future generations are also not specifically protected under the Constitution. If there was a public trust doctrine inherent in, or amended to, the existing Constitution, environmental protection could be embodied under such a provision. This would obligate current generations to protect and preserve the environment for the benefit of future and present generations. It is doubtful that anyone would believe that the framers of the Constitution did not have future generations in mind when they crafted the U.S. Constitution. A desire for the well being of future generations was implicit at the time the Constitution was declared. However, it has been over two hundred years since the document was created and society has changed considerably. Changes in society have been reflected in the Constitution through the creation and implementation of Amendments. Inclusiveness of the Constitution has been widely expanded as society has deemed the inclusions necessary and mandated. Still, provisions for the rights of future generations have not been demanded, either because society has not demanded them, or because government has not responded to societal demands. A third assumption that links both of the previous theories is that perhaps the inclusion of future generations has not been sought because humans tend to value the present more than the future. This is certainly the assumption used and reflected in current government cost benefit analysis, public consumption models, and general investment theory.

Basic biology reveals that it is in the interest of a species' long-term survival to protect future generations from actions of the self-interested, current generations. A poignant analogy offered by Harvard professor, Dr. William C. Clark, illustrates this point by comparing unfettered human activity to bacterial growth[3]. When bacteria are introduced into a nutrient-rich petri dish, growth begins rapidly. In time, the bacterial

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[1] Karkkainen BC, "Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?", Georgetown Law Journal, Vol. 89, 2000-2001, p.264 & 265

[2] David Orr, "The Constitution of Nature", Conservation Biology, Vol. 17, No.6, Dec 2003, p. 1479

[3] Readings from Scientific America, *Managing Planet Earth*, W.C. Clark Chapter 1 "Managing Planet Earth", p.1, W.H. Freeman and Company, USA, 1990

growth depletes the available nutrient resources and the waste from the bacterial processes builds up. Soon, with no place left to go, lack of nutrient resources causes growth to stop and the bacteria begins to be crowded by it's own waste. The bacteria eventually die because they followed their own biological drive to consume and expand. Bacteria are at a disadvantage to humans because they are not able to be forward thinking. Humans have the advantageous ability to recognize destructive patterns, biologically or otherwise driven, and deal with them accordingly. Human abilities of reflection, foresight, and planning enable us to consider the long-term survival of our species. Our species' long-term survival depends on the well-being of future generations and is linked inextricably to the actions of current generations. It is the human ability to limit itself (ex. from biological drives, societal preferences, consumption patterns, etc) that will enable the long-term survival of the species.

Extending Constitutional consideration and protection to future generations would help bolster environmental protection, as well as many other rights and needs of the human species. After all, what good is it to have the right to free speech, religious practice of choice, freedom of the assembly, or low price goods and services, if you cannot enjoy them because the air is unhealthy, water is polluted, agriculture is failing, weather is increasingly extreme, nature is obstructed, and quality of life is greatly diminished? While these examples are alarmist, they serve to illustrate that environmental degradation can trump other societal rights and desires. This is because humans are inseparable from the environment (which sustains their existence) and they cannot escape it (even if it becomes unsuitable to support human existence).

Con. - inclusive

Including protection for future generations in the US Constitution has many practical difficulties. Questions arise such as; 1) how would rights of future generations be determined and enforced in the present?; 2) who in the present, will speak on behalf of future generations?, and 3) how will the rights of future generations be honored in practice?[4] These questions are not easily answered but can be framed in relation to other, non-environmental scenarios. Regarding the first question, technological advances have been used to illustrate the rights of future generations[5]. For example, do future generations have the right to unobstructed genetics in the face of genetic-altering science? If humans experiment and create positive and/or negative genetic features that proliferate throughout the species, new human traits could be created that are positive or unintentionally negative. Would future generations endorse such experimentation? How can people of the present understand the preferences or best interests of future generations? More tough questions arise, but it is easy to ascertain that the rights of future generations are applicable to science and technology, not just the environment.

David Orr believes that trusteeships and court-appointed guardians are best served to speak for those who do not have a voice (who will speak for future generations) and ensure that their rights will be honored in practice. There are forms of government policy in place to protect future generations such as land trusts, severance taxes, pollution taxes, depletion quotas, police power of the state through regulation, etc[6]. Though there are difficulties in the practical application of these methods, these difficulties should be viewed as opportunities for developing innovative solutions, not reasons for abandoning

[4] David Orr, "The Constitution of Nature", Conservation Biology, Vol. 17, No.6, Dec 2003, p. 1479
[5] IBID, David Orr , p. 1479
[6] IBID – Orr, p. 1479

the protection of future generations. While some forms of protection are in place for future generations, the rights of future generations are not recognized in the U.S. Constitution. An environmental right would do much to preserve the habitat for future humans and insure that benefit-seeking actions of the present are not undertaken at the cost of future generations. Environmental rights, while not directly protecting future generations from the effects of scientific and technological experimentation or other obstructions, may have the positive externality of serving as legal precedence for the rights of future generations.

Due Process Applicability

Due process of law ensures that a person receives fundamental fairness and substantial justice in the legal process[7]. It refers to how and why laws are enforced. The fourth Amendment guarantees, "the right of people to be secure in their persons, Houses, papers, and effects." Yet, with many environmental matters, these rights are being infringed upon. For example, the build up of toxic chemicals in the air has led to many adverse health affects. Biologist Joe Thornton reveals how chemicals like organochlorines have contributed to infertility, immune suppression, cancer, and developmental disorders in humans and wildlife[8]. For more information about the effects of pollution on human health, read the Public Health chapter of this book. The fourth Amendment offers people no protection or security from environmental pollution of this form. A person's body can be exposed to chemicals through the air, water, or food, without the person being aware of the violation. This is an infringement of a person's fourth Amendment rights. Due process of law would insure legal redress to a person who has been exposed to chemical contamination. However, the applicability of due process is uncertain in many environmental situations.

Ambient pollution in the air, water or food, is the result of chemical releases from various sources. Certain cases of acute chemical releases can be traced back to individual polluters, who can be prosecuted for their indiscretions. Most ambient pollution results from numerous sources contributing regulated amounts of chemical into the air or water. Karkkainen writes that toxic pollutants, "…are the more numerous, non-ubiquitous pollutants that may cause serious harm to human health and the environmental, but that are typically released in small quantities by widely varying sources and often do their damage through localized routes of exposure, sometimes at trace concentrations or low exposure levels"[9]. Pollution released from various emission sources builds up in the air and can be transferred into land or water through evaporation and precipitation cycles. Fish and livestock can ingest these chemicals from food or water. Some of these chemicals tend to store in the tissue of these creatures through bioaccumulation mechanisms. Humans are exposed to these chemicals by breathing air, eating contaminated fish, meats or produce, or ingesting contaminated water. With time, a person can build up a significant amount of chemicals in his or her bloodstream. This exposure and subsequent build up occurs without the knowledge or permission of the individual. Negative health effects may ensue depending on the pathology of the chemicals, sensitivity of the individual to the chemicals, and amount of exposure. The ill person's unalienable right to "life, liberty and the pursuit of happiness", as stated in the

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[7] *Black's Law Dictionary*, 6th Edition, West Publishing Company, Eagan MN, page 500
[8] Thornton J, *Pandora's Poison*, The MIT Press, Cambridge, Mass, 2000
[9] Karkkainen BC, "Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?", Georgetown Law Journal, Vol. 89, 2000-2001, p.265

Declaration of Independence, has been infringed upon. If a negative health outcome manifests, the person has no one to pursue for damages. Hence, the right to due process has been withheld from this person. Those who produce and release chemicals into the air have infringed upon the Fourth Amendment rights of those who have been exposed.

The Fifth and Fourteenth Amendments state that we cannot be deprived of life, liberty or property without due process of law. Victims of negative health outcomes related to ambient environmental pollution are not afforded this Constitutional guarantee. This enables polluters to be out of the reach of law, as long as they comply with applicable government pollution regulations. Government pollution regulations, however, do not always embody precautionary principles to do no harm. For example, a 1990 study by Greek and Dorweiler suggest that carbon monoxide regulation under the National Ambient Air Quality Standards (NAAQS) do not effectively protect the health of United States citizens[10]. The reality is that for many toxic substances, there is no safe threshold of exposure. The government must determine arbitrary thresholds based on the best scientific data available at the time to protect human health. In a 1977 Senate hearing over the Clean Air Act, Senator Muskie testified that, "Our public health scientists and doctors have told us that there is no threshold, that any air pollution is harmful. The Clean Air Act is based on the assumption, although we knew at the time it was inaccurate, that there is a threshold."[11] This is not to suggest that the government maliciously falsifies regulations, only that they seek middle ground. Government must reach a middle ground where chemical producers and users can operate, but not cause harm to the health of citizens. As scientific understanding grows, it becomes apparent that years of chemical buildup in the environment have caused significant negative health outcomes. While regulators may have earnestly tried to protect public health, their efforts may not have been enough. Much like the lack of environmental protection offered by the framers of the U.S. Constitution, government legislators perhaps could not envision the shortcomings of their efforts. After all, some regulation is better than no regulation. Similarly, the framers of the Constitution probably did not envision carcinogenic, mutagenic, or radioactive substances. Each generation is subject to imperfect information. As information improves, society adjusts and amends the Constitution to reflect the new concerns affecting the public.

Con – Due Process

Due process has two main roadblocks with respect to ambient environmental pollution; it is hard to determine an entity to seek damages from, and it is hard to prove a causal relationship between pollution and damages incurred. Because so many polluters contribute to ambient environmental pollution, it is hard to seek out individuals or groups to seek for damages. Moreover, proving that a person's negative health outcome is causally related to environmental pollution is extremely difficult. Acute, short-term pollution exposures, that cause disease, are more straightforward to prove. Chronic, long-term exposures, as is the case with ambient environmental pollution, are very difficult to prove. This is because there is a latency period. Latency is the time it takes from exposure to the manifestation of the disease. A person may be exposed to years of ambient environmental pollution before they show signs of negative health outcomes. In

[10] Greek & Dorweiler, "Regulation of Carbon Monoxide: Are current standards safe?", Environmental Science and Technology, Vol. 24, No.1 1990 p. 32

[11] Schoenbrod D, "Goals statutes or rules statutes: the case of the Clean Air Act", 1983 UCLA Law Review Vol. 30, p. 763 footnote

Frag of Power

legal framework, there must be proof that environmental pollution caused disease for damages to be awarded. The answer to this problem is not to seek out creative methods to locate defendants or prove damages of plaintiffs. The answer is to eliminate the problem of ambient environmental pollution. This can be done by substituting less harmful chemicals for the toxic ones, changing industrial processes, strengthening pollution regulations, lowering allowable emissions levels, and eliminating processes that present increased risks to human health. I believe the establishment of an environmental right would be instrumental in reaching this end.

Fragmentation of power is an important tool used to combat tyranny and insure fairness in a centralized government, such as the United States. This, along with systems of checks and balances, is used to prevent any government branch (executive, legislative or judicial) from garnering too much power. These two methods help insure democracy, and prevent dictatorship or governmental pirating. Fragmentation of power and checks and balances were intended by the framers to limit and divide power. However, as the government has grown over time, fragmentation of power and checks and balances have limited the ability of the government to anticipate, prevent, or respond to problems[12]. Kettl echoes this sentiment maintaining that, "…government at all levels has found itself with new responsibilities but without the capacity to manage them effectively", in the face of globalization[13]. Evidence of this can be seen from the 9/11 tragedy, where various government agencies had intelligence information hinting at an attack, but had no means by which to coordinate. The Office of Homeland Security was formed after the attack in an attempt to coordinate various Federal agencies and enable information sharing. With respect to environmental protection, many government programs are also out of sync. David Orr offers the example of the Department of Commerce's (DoC) objective to promote economic expansion. The federal EPA is then expected to deal with the environmental issues that result from the DoC mission[14]. Orr goes on to mention how the Department of Energy promotes the proliferation of nuclear power plants, while the Department of Defense has the increased task of defending these plants from terrorists[15]. The power of government has been dominated by many vertical relationships (delegation of administrative duties to different specializing agencies). Inefficiencies result as individual goals of each agency are pursued, instead of pursuing those goals within the framework of the government as a whole. Kettl describes how globalization has pressured governments into expanding vertical and horizontal relationships, but this expansion has resulted in a lack of coordination rendering the government incapable of addressing issues of global importance, like the environment[16].

David Orr goes on to criticize how government regulations are formed. He cites the Clean Air Act (CAA) of 1970, stating that the industrial emissions regulations were 'disjointed and incremental'[17]. This is because the scrubbing method used to remove pollutants from power plant emissions, mandated by the CAA, simply removed them

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[12] David Orr, "The Constitution of Nature", Conservation Biology, Vol. 17, No.6, Dec 2003, p. 1481
[13] Kettle DF, "The transformation of Governance: Globalization, Devolution, and the Role of Government", Public Administration Review, Vol. 60, No. 6, Nov/Dec 2000, p.488
[14] OpCit – Orr, p. 1481
[15] IBID – Orr, p. 1481
[16] Kettle DF, "The transformation of Governance: Globalization, Devolution, and the Role of Government", Public Administration Review, Vol. 60, No. 6, Nov/Dec 2000, p.495
[17] OpCit – Orr, p. 1481

from the air and deposited them on land. This method of pollution reduction was disjointed because it didn't really reduce the pollution, it just transferred it to a different medium. These solutions were only incremental because they merely made the problem less bad instead of providing a true correction. To this effect, Orr claims that the government deals with 'coefficients of problems' instead of the root cause of the environmental problem[18]. In this sense, governments merely manage environmental problems instead of anticipating, responding to, or preventing them. This could be a function of fragmented power and checks and balances. No one would believe that the framers of the Constitution wanted fragmentation of power to be a roadblock to the creation of effective environmental or public policy. This is an unintended result of a very good policy to limit absolute power. In fact, there are many examples where checks and balances have proved to be helpful to environmental policy. Recent examples are how Congress has rejected pushes from the Bush Administration to relax pollution regulations on power plants, and how Congress has repeatedly raised the proposed EPA operating budget from what the Bush Administration has suggested. Fragmentation of power and checks and balances must exist, but that does not mean they are mutually exclusive with efficient environmental policy. An environmental right would help prioritize and coordinate federal efforts towards environmental protection, thus offsetting the negative effects of fragmentation and check and balances.

Does the United States Need an Environmental Right?

Are Constitutional environmental rights a necessary addition to the current mechanisms of environmental protection in the United States? Perhaps the same ends could be reached by currently existing, or otherwise more efficient means? In the United States, the best way of answering these questions is by examining the current structure of environmental protection. Environmental protection in the United States is spearheaded by the U.S. Environmental Protection Agency (EPA), which was created in the 1970's during the 'rights revolution'.

NEPA & CEQ history

To fully understand the history and construction of the EPA, one must examine the National Environmental Policy Act (NEPA) and the Council on Environmental Quality (CEQ), the first real federal attempts at comprehensive environmental protection. The NEPA, established in 1970, was responsible for a heightened awareness of general environmental concerns across government agencies and reduced fragmentation of dealing with environmental problems. NEPA required environmental impact statements be prepared for major federal actions having significant impacts on the environment and created the CEQ. The CEQ was established in 1970 to coordinate federal environmental policy. The CEQ 's main function was to assist the president in the preparation of environmental quality reports and conduct studies, gather information on environmental quality, analyze the strength or lack thereof of federal programs affecting the environment, and required environmental impact statements. These environmental impact statements were required, though the CEQ could not reject or prohibit programs that would cause extensive damage to the environment[19]. The CEQ had no regulatory,

[18] IBID – Orr, p.1481
[19] IBID, McKay p. 1768

coordinating or supervisory powers, was unable to force other agencies to act in environmentally protective manners, and was only responsible to the President. Debate preceding the establishment of the CEQ included: degree of independence of the agency, powers to halt government projects that harmed the environment, rights to a healthful environment, overlap with other regulations, environmental impact statements, and power of CEQ to review and approve agency procedures for evaluating environmental concerns[20]. Federal agencies were required to consult with the CEQ regarding actions taken that would impact the environment, but the CEQ was not given power to stop or affect the actions of the other agencies. In other words, NEPA and the CEQ had very little autonomy, authority, or powers from the time of they were created.

History of the EPA

Distrust of the EPA

The EPA was created in December of 1970 after the NEPA and CEQ were established. When it was created the EPA was transferred only nine of the fifty environmental protection laws to administer, with the remainder being delegated to pro-development interested agencies[21]. "Simply put, EPA was not trusted", states Lazarus,

> "Myriad interests groups were potentially affected by a federal agency responsible for environmental protection. Some favored the agency's establishment and its mandate; many others, however, were threatened by both. All recognized that the agency would face tremendous pressures in its effort to fashion and implement federal environmental protection laws."[22]

Because of the breadth and scope of the environment itself, the task of protecting it encompassed many duties that could potentially affect economic, political, industrial, consumer, and many other realms of American life. Giving the EPA too much power left numerous vulnerable sectors open to costly fines, curtailed business practices, increased taxes, strict regulations on operations, and other costly impositions. Since the environment has no single owner or manager to bring suit against offenders, or no right or caretaker to protect its interests, the government was accountable to no one for making regulations loose, or handicapping an environmental administrative agency. After all, the EPA was the first of its kind, and it is logical to believe that weak environmental protection is better than no environmental protection.

EPA lack of 'right'

The EPA is often criticized for its failures, which most attribute to the faults in the agency's structure and the statues it was asked to protect[23]. The EPA has the difficult task of protecting an entity not truly recognized as a right. Unlike other agencies created out of the 1970's 'rights revolution', the EPA has no Constitution right to protect or enforce. Some believe this fact helps explain why it has failed to meet its statutory mandates[24]. Because the EPA has no underlying right directing its operations, all three branches of government (executive, legislative, and judicial) are able to minimize environmental protection regulations, historically to the favor of predevelopment and industrial interests (see KWR in Environmental Justice chapter)[25].

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[20] IBID, McKay p.1766

[21] Lazarus RJ, "The tragedy of distrust in the implementation of federal environmental law" Law and Contemporary Problems, 1991 vol. 54 issue 4, p. 316

[22] IBID, Lazarous p. 316

[23] McKay, MB, "Environmental Rights and the US System of protection: why the US Environmental Protection Agency is not a rights based administrative agency", Environment and Planning A, 1994 Vol. 26, pg. 1761-1785

[24] IBID, McKay p. 1761

[25] IBID, McKay p. 1761

Control over EPA by E, L, J

An historical examination of the creation of the EPA, by MB McKay, reveals that the executive, legislative and judicial branches of government who created the EPA have struggled for control over the agency and over the scope of the agency's power since its inception. This can be seen by the fact that the agency was given insufficient autonomy in decisions, yet full accountability for mistakes. This lack of autonomy is evident in the fact that the legislature set quite specific goals and deadlines for the EPA, the agency did not set its own goals. Accountability was directed towards the agency, not the legislature who directed it. An example is the 1970 Amendment to the Clean Air Act, where Congress defined the level of automobile emissions from mobile pollution sources, instead of letting the EPA determine the level autonomously. Congress also controlled who and how much could be sought for violations of the act. Citizens could only sue after the agency sued first, and could only recoup attorney fees and no payments for damages[26]. This limited the power of citizens to address environmental violations by making the EPA a 'gatekeeper'.

No autonomy & full accountability

Congress gave the EPA the responsibility of achieving the goals of the Clean Air Act, but did not define or give concrete guidance as to what the goals were. The primary goal of the Clean Air Act was to impose a standard to reduce ambient pollution, "allowing an adequate margin of safety...to protect public health" {1970 CAA 109 (b)(1)} and a standard for hazardous pollutants to provide "an ample margin of safety to protect the public health"[27]. However, Congress gave no direction to the EPA or the judiciary as to their definition of 'adequate' or "ample" and presumed that the EPA could demonstrate a level of pollution that could separate healthy from risky[28]. Congress knew there was no threshold level between healthy and risky, according to Senator Muskie at Senate Hearing in 1977,

> "Our public health scientists and doctors have told us that there is no threshold, that any air pollution is harmful. The Clean Air Act is based on the assumption, although we knew at the time it was inaccurate, that there is a threshold. When we set standards, we understood that below the standard that we set there would still be health effects. The standard we picked was simply the best judgment we had on the basis of the available evidence as to what the unacceptable health effects in terms of the country as a whole would be." [29]

Unclear definitions by Congress

The States shared the burden of implementing provisions of the Clean Air Act, as they were required to submit plans to the EPA on how they would achieve the emissions reductions goals. However, if the state did not submit a plan, the EPA was required to create one for them[30]. This made an impossible job for the EPA, giving the agency goals without direction, discretion without autonomy, and making the agency responsible for state implementation plans. The disconnect resulting from the EPA inability to form it's own directives led to ambiguity, inefficiencies and eventually, failures.

Budgetary constraint on EPA by ELJ - CBA

There is more proof that the EPA struggled without a Constitutional right at its foundation. Strict budgetary restraints put on the agency from the executive branch (White House) and the legislative branch (some pro-development members of Congress) undermined the mission of the EPA. The imposition of cost-benefit analysis on all

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[26] IBID, McKay p. 1762
[27] Schoenbrod D, "Goals statutes or rules statutes: the case of the Clean Air Act", 1983 UCLA Law Review Vol. 30, p. 762-763
[28] IBID, Schoenbrod
[29] IBID, Schoenbrod, p. 763 footnote
[30] IBID, Schoenbrod, p. 764

environmental regulations was a disregard to any right to a clean environment[31]. The Clean Air Act Amendments, "conferred on everyone an absolute right to healthy air in the 1970s, but it gave the corresponding duty only to EPA, which had just been born with legal duties far in excess of its political power and administrative resources."[32] Additionally, the way the EPA is constructed, "citizens with an absolute right to breathe clean air can hold no one on earth to account in law[33]". This is a violation of citizens Constitutional right to due process. While the EPA was given the task of protecting the environment for the people, it was subject to cost constrictions and trumping powers of Congress and the White House.

Goals-based not rights-based

In the absence of an environmental right, other features were used to guide and construct the operations of the EPA. The EPA was given goals-based statues, not rights-based authority, which led to the failure of many of its regulatory efforts[34]. Schoenbrod states that goal-based statues, "allocate decision-making authority to entities that usually have less legitimacy than Congress to make value judgments stick[35]" he goes on to state, "In a goals statute, the legislature does half the job: it promises benefits without allocating costs, and it broadcasts rights without assigning duties"[36]. Goals-based statues give the EPA discretion, but not control. The executive branch can manipulate EPA discretion in order to undermine the feasibility of Congressionally set goals. This could be done by CBAs or minimal interpretations of the law. The nature of these goals-based statutes practically dictates that the goals cannot be met. The EPA also has problems meeting Congressionally imposed goals because so many constraints are placed upon the agency (cost-benefit analysis, lack of autonomy in initial emission settings, lack of state enforcement, etc). Congress basically left the EPA with two choices; 1) meet statutory goals regardless of costs, or 2) balance health and environmental quality with costs[37]. Not having a Constitutional right or similar foundation to stand on, the EPA was forced down the latter path (by the executive branch), since the former would have resulted in opposition and stalemate.

Congressional mandates imposed on the EPA were not often accompanied by the necessary funds to implement them. These mandates publicized benefits without allocating costs. This resulted in politicians taking credit for the promises made in the mandates, but not taking responsibility for the associated costs or failures resulting from lack of funding. The Unfunded Mandates Reform Act (UMRA) of 1995 attempted to prevent Congress from imposing costs on states (or agencies) without providing appropriate federal funds. The Act requires the Congressional Budget Office to give a detailed estimate for bills that impose over $50 million or more on the public sector or $100 million or more on the private sector. The UMRA, though good in theory has one

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[31] McKay, MB, "Environmental Rights and the US System of protection: why the US Environmental Protection Agency is not a rights based administrative agency", Environment and Planning A, 1994 Vol. 26, pg. 1764
[32] OPCIT, Schoenbrod, pg. 748
[33] IBID, Schoenbrod, p. 748
[34] IBID, Schoenbrod
[35] IBID, Schoenbrod, p. 819
[36] IBID, Schoenbrod, p. 754
[37] McKay, MB, "Environmental Rights and the US System of protection: why the US Environmental Protection Agency is not a rights based administrative agency", Environment and Planning A, 1994 Vol. 26, pg. 1765

major flaw, it only applies to new mandates. Existing mandates are exempt from the UMRA, so all existing EPA regulations that are poorly funded will not have a chance to be reformed. The UMRA may help future environmental regulations from failing because of Congressional inconsistency, but it does not address the problem comprehensively.

The EPA is also faced with difficulties in the way it is tasked to comprehend the scope of environmental regulations. It is one of the only agencies that has to simultaneously balance expertise in many sectors such as science, economics, social studies, law, and political science. In the years following its inception in 1970, Congress and the executive branch (under the Nixon administration) continued to put pressure on the EPA to act in ways dissimilar from other agencies. Most agencies similar to the EPA were seen as neutral decision-makers concerned with matters under their jurisdiction. The EPA, however, was forced to proactively announce and enforce regulations[38]. McGarity outlines how Congress granted the EPA extraordinary power (but not control) that affected important aspects of industrial life. This was to be accomplished by informal rulemaking (which provided the public with notice of the terms of the agency's proposal), public comment period, agency rational for final rule, and responses to public comments. The Office of Management and Budget's cost benefit analysis requirements and Congressional oversight eventually checked this informal rulemaking authority of the EPA[39]. A very basic summary of how the EPA currently formulates rules is that Congress delivers the EPA laws, the executive branch appoints an agency chief and various directives, and the agency formulates ways of administering the laws and directives. When formulating regulations, the EPA operates under a negotiated rulemaking process. A proposed regulation is negotiated between the agency, industry and other concerned parties. After a tentative agreement is reached a notice is released and public comment period is put into effect. Barring any obstacles from the public or the Office of Management and Budget, the rule then becomes effective.

Checks and balances on EPA

Write more about C&B

There have been bipartisan bills in the House and Senate to elevate the U.S. Environmental Protection Agency to Cabinet level status. The existence of these bills indicates that there is a need to give the agency more power to do its job correctly. Currently, the EPA is considered an independent agency of the United States government, resulting from a statute passed by Congress. The EPA is not part of the executive department, but the president does appoint its chief. Elevating the EPA to the Department of Environmental Protection would put the chief of the department on the president's Cabinet level of advisors. This would allow environmental concerns to be voiced when considering non-environmental issues that are important to the nation. Additionally, it will make other departments aware of pertinent environmental issues facing the nation. Republican Congressman Sherwood Boehlert (NY) stated that the U.S., Libya, Monaco, Peru, and six other countries are the only 'holdouts' that have not chosen to make their primary environmental agencies Cabinet level departments[40]. This

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[38] McGarity T.O., "The Internal Structure of EPA Rulemaking", Law and Contemporary Problems Vol. 54 Issue 4, p. 58

[39] IBID, McGarity, p. 58

[40] House of Representative Website – News, "Boehlert Testifies Before Senate Committee on Elevating EPA to Cabinet Level Status" July 24, 2001, located at http://www.House.gov/boehlert/epabillSenate.htm accessed on March 29, 2006

move would improve coordination efforts with other Cabinet departments such as the Departments of Energy, Interior, Defense, etc. while also elevating the environment to a higher status on the executive agenda of any administration. Former EPA Chief Christie Todd Whitman testified in a House of Representative sub-committee hearing about elevating the EPA to Cabinet-level status that, "Quite frankly, I cannot think of a Cabinet department with which the EPA does not interact. I would consider it vital to the work of future Administrators – and vital to our country…"[41]. According to Senator Susan Collins Congress has tried many times to elevate the EPA to Cabinet-level status, but each effort failed. This failure was not due to the idea, but was more a result of 'extraneous baggage' that was added to each effort[42]. While many support the elevation of the EPA to Cabinet-level status, others are skeptical. Some argue that elevating the EPA to Cabinet-level status will make the president's Council on Environmental Quality obsolete. The U.S. Chamber of Commerce is unlikely to support such efforts as they believe that much of the EPA's science has been inconsistent and developed secretly without public input or peer review. Bill Kovacs, the Chamber vice president of environmental policy, stated, "Simple elevation of the agency without specific reforms, especially in the area of sound science and transparency, would be a big government disaster"[43].

Other's suggest that the EPA needs to be independent and further insulated from the executive branch and other political pressures, maintaining that the EPA be structured like the Federal Trade Commission, Interstate Commerce Commission, or Federal Communications Commission whom all have legislative and executive functions[44]. Commissioners of these organizations have staggered terms so that no single administration can affect them too drastically. Such structuring would allow the EPA to act independently for the interests of the public, regardless of whether their decisions affect special interests or not. Advocates of this course of action also maintain that science could more effectively be used to shape environmental policy under this type of organizational structure.

The science of the EPA is often criticized. Many believe that the agency's science has been weak, inefficient, and largely ignored by policy makers. The U.S. Chamber of Commerce filed a Data Quality Act (DQA) complaint against the EPA on the grounds that the agency's environmental databases of scientific information are plagued by errors and uncertainties with respect to fundamental scientific information. The U.S.

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[41] EPA Website – "Testimony of Governor Christine Todd Whitman Administraotr of the U.S. Environmental Protection Agency Before the Subcommittee on Energy Policy, Natural Resources and Regulatory Affairs of the Committee on Government Reform" U.S. House of Representatives, July 16, 2002, located at http://www.epa.gov/ocir/hearings/testimony/107_2001_2002/2002_0716_ctw.pdf accessed on April 4, 2006

[42] Senate Website – "Statement of Senator Susan M. Collins – Government Affairs Committee hearing on raising EPA to Cabinet Level" located at http://www.Senate.gov/~govt-aff/072401_collins.htm accessed on March 29, 2006

[43] Food Engineering Website – Regulatory Watch: Cabinet level status for EPA?, Mark Huffman, March 2003, located at http://www.foodengineeringmag.com/CDA/Archives/820eee16f42f8010VgnVCM100000f932a8c0____ accessed on March 29, 2006

[44] Environmental Research Foundation Website – Rachel's Environment & Health News # 392 – Cabinet Status Won't Help EPA", June 01, 1994, located at http://www.rachel.org/bulletin/pdf/Rachels_Environment_Health_News_735.pdf accessed on March 29, 2006

Geological Survey (USGS) first identified the problem; Eastman Kodak then evaluated the problem and found that much of the information supplied by the EPA database was unreliable[45]. The EPA countered that they did not have the authority to perform the review that the DQA complaint called for. This failure to address the problem on grounds of lack of authority may further illustrate the lack of autonomy and independence the agency actual has. The Chamber of Commerce states that the databases have multiple entries with significantly different physical-chemical constants listed for various chemicals. One of the uses of these constants is to perform risk assessments on various environmental conditions. Incorrect constants could greatly reduce or increase the risk and associated costs of certain projects or situations. This could lead to overly expensive abatements or solutions that do not protect the public from risk. The Chamber of Commerce sent the EPA multiple requests for data correction that were ignored for the most part. A third party request for the data correction was sent to the EPA from the Swiss Federal Institute of Technology. Eventually, the EPA did remove the Soil and Transport Fate database from its website and made a small change to its PBT Profiler database. In January of 2006 the Chamber of Commerce appealed to Congress to investigate why the EPA has refused to correct the faulty data and models it bases its science on.

Sean Moulton, senior policy analyst of the Office of Management and Budget Watch believes that the changes the Chamber of Commerce is seeking, "…are unrealistic because the agency can't afford the time or expense of revamping the databases. Correcting the errors would take EPA away from other priorities."[46] The Bush Administration has continually cut funding to the EPA, in fiscal year 2007 the administration has proposed a 4.1% budget cut. This budget cut calls for an 80% reduction in funding for the EPA's national library network, bringing the operating budget for the network from $2.5 million to $500,000. According to the EPA, this library network includes, "a wide range of general information on environmental protection and management; basic sciences such as biology and chemistry; applied sciences such as engineering and toxicology; and extensive coverage of topics featured in legislative mandates such as hazardous waste, drinking water, pollution prevention, and toxic substances"[47]. Although the EPA has obviously mismanaged the scientific databases under its control, it is difficult to imagine how appropriate monitoring and maintenance can be performed under oppressive budgetary restrictions. If Congress does not limit the proposed cuts, it is difficult to imagine the agency's ability to correct the costly problem in the face of such strict budgetary pressure. The budgetary constraints imposed on to the EPA from the executive branch could force the agency to close down many of its libraries.

There are many problems with the EPA, but do these problems necessitate an environmental right to correct them? According to Gartenstein-Ross, environmental

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[45] The Heartland Institute Website – "Bad data in EPA databases result in bad policy", William Kovacs, Nov 2005, located at http://www.heartland.org/Article.cfm?artId=17981 accessed on March 30, 2006

[46] Washington Post Website – EPA Data Not Reliable, Business Lobby Says", Cindy Skrzycki, June 7th 2005, located at http://www.washingtonpost.com/wp-dyn/content/article/2005/06/06/AR2005060601854_pf.html accessed on March 30, 2006

[47] EPA Website – About EPA Libraries", located at http://www.epa.gov/natlibra/overback.htm accessed on March 30, 2006

rights do not fit with the present structure of the environmental regulatory system[48]. The author claims that the federal government's current approach to environmental protection is both overinclusive and underinclusive. Overinclusive because it sets regulations that all areas must adhere to, even if citizens are not at risk, creating economic inefficiency. Underinclusive because there is no minimum level of environmental quality guaranteed, creating increased risks for some citizens. The author claims that the current regulatory system addresses specific pollution problems instead of directly controlling the environmental risk levels which citizens and communities are exposed. Gartenstein-Ross believes that an environmental right would be a poor fit with the current regulatory system, because of the increased costs created to administer the right and the underinclusiveness of the current regulatory system. Instead, Gartenstein-Ross advocates flexible, cost-effective, direct regulation of the cumulative levels of environmental risk which citizens and communities are exposed[49]. He points to the European Community's principle of proportionality as an appropriate guide to helping reach the most optimal combination of environmental protection, cost effectiveness and risk management. The principle of proportionality states that any layer of government should not take any action that exceeds that which is necessary to achieve the objective of government.

It is evident that the EPA faces many problems from internal structuring instability to susceptibility to external political pressure. Since the EPA is the primary source of environmental protection in the United States, it is fair to say that the problems associated with the EPA may prevent an optimal level of environmental quality to be reached. Correspondingly, it is logical to believe that the problems facing the EPA warrant additional and improved measures of environmental protection. Without significant reforms at the EPA, an environmental right may not be the best solution for America. An environmental right would mandate internal and external reforms with respect to the EPA. Internal reforms would emanate from the agency finally being given a right to protect. This would change the structure and function of the agency at all levels of operation. External changes would include limiting power and influence that the respective branches of government can exercise on the agency. It could also elevate environmental protection to a higher level of national awareness and priority.

Who Controls the EPA ?

Agency Capture

'Agency capture', as referred to by Lazarus, is the domination of the EPA by an adverse competing interest[50]. Lazarus goes on to identify the three theories of agency capture that have influenced the EPA's development. First, Professor Marver Bernstein[51] hypothesis that over time administrative agencies tend to associate with the community they regulate. This is because the regulators rely on the regulated to supply information. Cooperation develops and this cooperation could lead to capture of the regulators by the

[48] Gartenstein-Ross D, "An Analysis of the Rights-Based Justification for Federal Intervention in Environmental Regulation", Duke University Environmental Law and Policy, Vol. 14, No. 1, 2003-2004, p. 185-243

[49] IBID, Gartenstein-Ross, p.190

[50] Lazarus RJ, "The tragedy of distrust in the implementation of federal environmental law" Law and Contemporary Problems, 1991 vol. 54 issue 4, p. 316

[51] See Marver Bernstein, *Regulating Business by Independent Commission*, p.79-90 (Princeton U Press, 1955)

regulated. Second, Professor Joseph Sax[52] believes that agency personnel tend to bargain away environmental values as part of the political process, because the constant demands on the bureaucracy are too great. Agency personnel have no way to insure the long-term protection of the environment or natural resources in the face of powerful economic interests. This pressure causes them to make compromises in order to achieve minimal levels of environmental protection. Third, James Q. Wilson[53] suggests agency capture by its own bureaucracy, where the agency pays to little attention to the needs that they regulate. Wilson's theory maintains that EPA career personnel could be subverting the executive agenda by conspiring with external environmental organizations. This type of agency capture is often exhibited in agencies with a social mission, like the EPA. This is because environmentally minded employees may align themselves with external actors who share similar social goals. While there are many theories about who currently controls the EPA, it is most likely that all three forms of agency capture exist at some level. However, it is most likely that Sax's theory dominates, as the executive, legislative and judiciary (to a lesser extent) branches of government all vie for control over the EPA.

2 Probs. Imposed by E & L
1)Fragmentation
2) CBAs

According to McKay, the EPA suffers from two major problems that prevent it from protecting the environment; fragmentation and cost-benefit analysis (CBA)[54]. The first problem is fragmentation on two levels, within the EPA and between the oversight committees of the White House and Congress. Within the EPA, fragmentation occurs between the agency environmentalists and economists carrying out cost-benefit analysis. Externally, fragmentation exists between the oversight committees of the White House and Congress, who have different economic and political agendas. The breadth of environmental protection affects multiple special interest groups. Accordingly, pressure exerted on the executive and Congressional branches tend to result in opposition instead of cooperation. Congress also added to the fragmentation within the EPA by enacting legislation to tackle specific forms of pollution (air or water pollution) instead of giving the EPA a cohesive goal of ecosystem protection or maintaining a specific level of environmental quality. This piecemeal approach has proven to be ineffective in reducing pollution, because pollution can be transferred from air to water mediums, giving the appearance but not substance of environmental protection. The piecemeal approach of the legislature also has led to inefficient implementation of regulations. This is because numerous regulatory programs, with many unique requirements, can be conflicting and harder to enforce than one comprehensive rule.

History of the CBA

The original cost-benefit analysis (CBA) requirements, imposed on the EPA from the executive branch, came in the form of quality of life (QOL) review processes. The QOL was basically a cost-benefit analysis and alternative measures report, required on every regulatory program drafted by the EPA. This QOL process eventually turned into President Reagan's Executive Order 12291, which now requires CBAs for all government regulatory programs costing over $100 million. Initially, however, "the QOL process was applied only to EPA regulations – other regulations regarding

[52] See Joseph L. Sax, *Defending the Environment* (Knopf, 1970)
[53] See James Q. Wilson, *Bureaucracy: What Government Agencies Do and Why They Do It*, p.73-74 (Basic Books, 1990)
[54] McKay, MB, "Environmental Rights and the US System of protection: why the US Environmental Protection Agency is not a rights based administrative agency", Environment and Planning A, 1994 Vol. 26, pg. 1772

consumer protection and health and safety matters were usually spared the rigour of confrontation with a hostile and economically hypnotized Department of Commerce.[55]" The subjection of all EPA regulations to cost-benefit analysis (that is fundamentally flawed with respect to environmental valuation – for more information on this read the economics chapter) undermined the agency's ability to operate effectively, independently, and in a manner consistent with the spirit of it's mission, "to protect human health and the environment[56]". Landy et al suggest, "EPA's decision-making autonomy was also severely restricted by Executive Order 12291{the CBA mandate}."[57]

It is unreasonable to enact environmental protection without cost considerations. It is the very function of government to maximize societal welfare in the face of limited inputs. Even a Constitutional environmental right would have to have cost considerations and limits. However, the methods of CBA used by the government are inherently flawed with respect to environmental valuation. CBAs are erroneous with respect to perfect substitutability assumptions, discount rates, future generation preferences, non-market goods valuation, and willingness-to-pay derived demand curves for environmental services (see the economics chapter of this book). Years of underestimating the value of environmental goods and services, through government CBAs, have contributed to the degradation of the environment.

Donald F. Kettl explains how fragmentation within the EPA has resulted in the agency doing very little itself[58]. Kettl maintains that the Justice Department litigates for the agency, private contractors carry out cleanup work, State government do the majority of law enforcement, Congress mandates the goals and environmental standards set by the EPA, and the EPA's most important functions are done in partnership with the states and private contractors[59]. Some of this fragmentation of responsibilities within the EPA could be seen as a positive thing. Partnering with private contractors allows the agency to find the cheapest provider of services, and thus reach a higher level of cost efficiency. Sharing responsibility with the states allows state governments to have more flexibility and sovereignty over their jurisdiction and can encourage innovation at sub-national levels[60]. This allows states to better address the specific environmental issues that concern them, thus increasing efficiency. However, some efficiency is also lost. As the world becomes more entrenched in globalization, pollution problems can expand in scope and intensity. Trade issues, increased economic competition, increased consumer demand for goods, increased supplier production demands, increased transportation demands, etc, all create pressure on the EPA to expand services and enforcement duties. While the EPA is being pressured to expand, it is also being pressured to fragment.

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[55] McKay, MB, "Environmental Rights and the US System of protection: why the US Environmental Protection Agency is not a rights based administrative agency", Environment and Planning A, 1994 Vol. 26, pg. 1765

[56] EPA Website – About EPA – Mission Statement, located at http://www.epa.gov/epahome/aboutepa.htm accessed February 2, 2006

[57] Landy et al, *The Environmental Protection Agency: Asking the Wrong Questions*, 1990 New York; Oxford University Press. p. 248

[58] Kettl, DF, "The Transformation of Governance: Globalization, Devolution and the Role of Government", Public Administration Review, Vol. 60, No. 6, Nov/Dec 2000

[59] IBID, Kettl, p. 493

[60] Walti, S, "The Impact of Federalism and Other Patterns of Institutional Fragmentation on Environmental Policy", Georgetown University Public Policy Institute, located on the Web at http://wc.wustl.edu/workingpapers/walti.pdf accessed on March 23, 2006

Economic pressures to outsource services, state desires for increased flexibility, federal budgetary pressure, executive political pressure, and the scattered nature of the agency's organization all contribute to agency fragmentation. Coordinating such a vast network of service providers, individual state regulations, budgetary concerns, and political sensitivities in an inefficiently organized agency structure is making it harder for the agency to operate effectively. The simultaneous pressures to decentralize while handling more globally concerned problems that require a centralized federal effort have placed the EPA in quagmire[61].

Executive contribution to Frag & CBA

Fragmentation, in the form of subjugation by the executive branch, is enabled in the absence of a Constitutional environmental right. Cost-benefit analysis almost guarantees that economic interests will dominate environmental protection. To compound the problem, cost-benefit analysis is inherently flawed with respect to valuating environmental features, goods, and services (See the economics chapter of this book). The effects of industrial lobby groups on the executive branch have further undermined the environmental protection efforts of the EPA. These lobby groups have affected the EPA from its inception when the National Industrial Pollution Control Council (NIPCC), comprised of CEOs from the most powerful U.S. corporations, began to consult with President Nixon over environmental matters. Rodgers described the NIPCC as, "a lobbying forum for industries chafing under the regulatory bit", and he reflects that, "Fostering conspiracy had become a conscious government policy"[62]. Rodgers referenced the fact that the NIPCC would not make official records of their closed meetings and that they were allowed to comment on proposed EPA regulation before the proposed regulations were published in the Federal Register or opened for public comment by other parties.

The Nixon-era NIPCC can be compared the modern day National Energy Policy Development Group (NEPDG). The NEPDG was a 2001 task force headed by Vice President Dick Cheney that included oil and gas industry executives from companies like Shell Oil, BP America, Exxon Mobil, Conoco, etc. Before he became vice president, Cheney was the chairman and CEO of the largest service provider for the oil and gas industry, the Texas-based Haliburton Co. This task force was assembled to develop national energy policy, inviting only energy industry executives and Cabinet level officials while excluding environmentalists. These meeting were held in secret and the White House has refused to release a list of the participants and the majority of relevant documentation regarding these meetings. The result of these meetings was a report issued that recommended opening more public land to oil and gas drilling plus a range of other pro-industry actions. Efforts by the Sierra Club and Judicial Watch to have the White House disclose the records of this meeting through the Federal Advisory Committee Act (FACA) have failed to date. Additionally, oil executives that were supposedly present at these meetings have testified in Congress that they did not attend these meetings. Commerce Chairman Ted Stevens (R-Alaska) decided not to have these executives swear in before their testimonies, therefore they cannot be exposed to perjury

[61] OpCit, Kettl, p. 493

[62] Rodgers WH Jr., "The National Industrial Pollution Control Council: advise or collude?" Boston College Industrial and Commercial Law Review, Vol. 13, p. 720-721 & 739 respectively

charges, and this was a very controversial decision[63]. Some assert that these secret meetings were held to shape favorable energy industry regulations in exchange for hefty campaign contributions[64].

The White House originally moved to dismiss the case in district court, stating that the disclosure was unConstitutional. The district court denied that motion and told the White House to either disclose the information or formally invoke the executive privilege to prevent disclosure. The White House appeal was heard by the U.S. Court of Appeals for the District of Columbia, who rejected the government's appeal, maintained that they did not have the authority to hear the case because the president had not invoked the executive privilege. The case was then sent to the U.S. Supreme Court. In Cheney v. U.S. District Court for the District of Columbia, the Supreme Court must decide on the Constitutional balance between confidentiality and public scrutiny for government leaders. The White House has argued to the Supreme Court that releasing these documents will hurt the White House's ability to receive candid advice from the private sector. They also maintain that the courts and Congress have no business making inquiries, even limited ones, into the decision-making power of federal agencies and officers[65]. Furthermore, the White House believes that they must protect their right to confidentiality and privacy granted by separation of powers. Arguments from the Sierra Club and Judicial Watch assert that private interests are improperly shaping public energy policy, and that the public has the right to know what went on in these secret meetings. They believe this case is about checks and balances that other branches of government have on the executive branch, to prevent the administration from catering to special interests and pork barrel politics.

In a 7-2 vote the Supreme Court sided with the White House in that the Court of Appeals was incorrect in concluding that they did not have the authority to decide on the Presidential appeal. They Supreme Court made the distinction that this is a civil proceeding and the rules of search would be different if it were a criminal case. They believe that the burden on the executive branch is heavy and that it must be protected against unnecessary requests for information that would divert resources and prevent the executive branch from carrying out its Constitutional duties. They also claimed that requiring the executive branch to claim executive privilege is too powerful an assertion. Their final rule was to send the case back to the Court of Appeals to decide the viability of the vice president's claims. The final ruling of the U.S. Court of Appeals Court sided with the vice president, claiming that the plaintiffs had failed to establish any duty owed to them by the federal government under FACA. This decision was arrived at since the nonfederal task force participants had no right to vote on or veto matters. David

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[63] Washington Post Website – "Document Says Oil Chiefs Met With Cheney Task Force", Millbank D, Blum J, Nov 16, 2005, page A01, located at http://www.washingtonpost.com/wp-dyn/content/article/2005/11/15/AR2005111501842.html accessed on April 4, 2006

[64] Time Magazine Website – "Getting in the Ear of Dick Cheney", Weisskopf M, Zagorin A, Time Magazine, Feb 3 2002, located at http://www.time.com/time/nation/article/0,8599,198862,00.html accessed on April 5, 2006

[65] CNN Website – "High court hears arguments on Cheney task force", Mears B, June 24, 2004, located at http://www.cnn.com/2004/LAW/04/27/scotus.cheney/ accessed April 5, 2006

Bookbinder, senior attorney for the Sierra Club stated, "The decision in not going to be helpful in assuring open and accountable government"[66].

Lobbying and pork barrel deals have created pressure on both national and local politicians to undermine environmental protection. Special interests groups can contribute heavily to political campaign funds, engendering significant influence on politicians. Businesses and industry lobby hard against environmental regulations, even if the costs resulting from the regulations are relatively insignificant. This is because they see such regulations as improper business costs, resulting from externally imposed social taxes that are placed on them illegitimately[67].

Examples of lobbyist and industry pressure on politicians are numerous. President Bush has appointed many former lobbyists as his political advisors. On the day of his inauguration, President Bush and his chief of staff, former General Motors lobbyist Andrew Card, enacted a moratorium on all recently adopted environmental regulations pending further investigation[68]. By 2002, with John Graham as the head of the Office of Management and Budget, the Bush Administration had rejected 17 environmental standards (more than the entire Clinton Era)[69]. Graham invited industry representatives to identify regulations that imposed too much of a burden on businesses. The result was the singling out of 57 health, safety and environmental regulations, which after think tank and trade association comment, became known as the "hit list"[70]. In December of 2003, the Bush Administration manipulated an EPA proposal to reduce mercury emissions by coal-fired power plants, as a result of industry lobbyist influence[71]. University of Washington scientific researchers accuse the Bush Administration of ignoring all the available data and opposition from both the medical and environmental fields in the proposed downgrades. They further maintain that the EPA and the Bush Administration drafted the limited mercury control plan in private negotiations with representatives from the utilities industry, with 'verbatim inclusions' from these private meetings making it into the new proposal[72]. In 1997, United States automakers lobbied against the Clinton Administration's plan to tighten metropolitan air quality standards and limit carbon

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[66] USA Today Website – "Appeals court backs Cheney n energy task force lawsuit", May 12, 2005, located at http://www.usatoday.com/news/washington/2005-05-10-cheney-task-force_x.htm accessed April 5, 2006

[67] Massachusetts Institute of Technology Website – The Economic Impact of Environmental Regulations", Steven Meyer, p. 11, located at http://web.mit.edu/polisci/mpepp/Reports/eier.pdf accessed on March 23, 2006

[68] Natural Resources Defense Council Website – "Rewriting the Rules: The Bush Administrations' Assault on the Environment", Perks, Warren & Wetstone, p. 24, located at http://www.nrdc.org/legislation/rollbacks/rollbacks.pdf accessed on March 23, 2006

[69] Office of Management and Budget Watchdog Organization Website – White House Subverting Health, Safety and Environmental Protection, located at http://www.ombwatch.org/article/articleview/1075 accessed on March 23, 2006

[70] Natural Resources Defense Council Website – "Rewriting the Rules: The Bush Administrations' Assault on the Environment", Perks, Warren & Wetstone, p. 24, located at http://www.nrdc.org/legislation/rollbacks/rollbacks.pdf accessed on March 23, 2006

[71] University of Washington's Earth and Space Sciences Website – "Political Alchemy and the Bush Administration: How your government is turning scientific fact into fiction", Harnmeijer et al, p.7, located at http://earthweb.ess.washington.edu/~jelte/Articles/Other/TheRapeofData.pdf accessed on March 23, 2006

[72] IBID, University of Washington

dioxide emissions[73]. They feared that lower emissions requirements would give foreign rivals a competitive advantage[74]. Countless authors and environmental activists have documented the negative affect business and industry lobbyists.

Aside from direct pressure on the executive branch, state and local governments are also subjected to lobby and business influence to undermine environmental protection. In 2001, General Electric was forced by the EPA to dredge New York's Upper Hudson River after the company dumped 1.3 million pounds of PCB's into the river. The company dumped the PCB's before the federal government banned the toxic substance in 1977. The cleanup effort will cost the company more than $500 million. It has been a 25-year process to figure out how to handle the PCB contamination problem in the Hudson. This delay was in part due to scientific uncertainties, but had more to do with opposition from General Electric (GE). GE claimed the river was cleaning itself, has brought a lawsuit to U.S. District Court challenging the Constitutionality of the Superfund law, spent millions to advertise the negative impacts of dredging the river, maintains that the state should pay for the cleanup, believes it dumped the chemicals legally, and has pressured local politicians to support them[75]. NY State Attorney General Eliot Spitzer accused GE of spending tens of millions of dollars to oppose cleanup efforts through advertising, lobbying, and other means[76].

NSR

Lobby

Lobbying no doubt has contributed to many efforts by the executive branch to affect environmental policy. The executive branch has a high degree of influence over the EPA and its resulting regulations, enforcement and directives. Another example of the executive branch's control over the EPA, and its underlying Congressionally set laws, is the New Source Review (NSR). The NSR is a permitting program under the 1977 Clean Air Act Amendments. The NSR is intended to 1) ensure air quality is not degraded when power plants are modified and 2) to assure people that new or modified industrial sources will be as clean as possible[77]. The NSR requires that as new plants are built or old plants are renovated, they should use the best pollution control available. The NSR is a technology-based, not health-based mandate. In 2003 the Clinton Administration decided to modify the NSR, which enable the administration to prosecute a handful of utility companies that had "violated the law"[78]. The Clinton Administration made changes to the NSR that, according to James Taylor,

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[73] Bradsher K, "Auto Makers Lobby to Stop New Air Quality Regulations", New York Times, June 29th, 1997, pg.18, Col. 3

[74] IBID, NY Times

[75] Associated Press, "EPA Orders G.E. To Dredge Hudson River", New York Times, NY Region, December 4, 2001 & Pianin E, and Powel M, "General Electric Ordered to Pay for Cleanup of Hudson", The Washington Post, December 5th, 2001, & The Office of New York Attorney General Eliot Spitzer Website – "Statement of Eliot Spitzer, NY State Attorney General, on the Environmental Protection Agency's Proposed Remedy for Contaminated Sediment in the Hudson River", Feb 26th, 2001, located at http://www.oag.state.ny.us/press/statements/epa.html accessed on March 23, 2006

[76] The Office of New York Attorney General Eliot Spitzer Website – "Statement of Eliot Spitzer, NY State Attorney General, on the Environmental Protection Agency's Proposed Remedy for Contaminated Sediment in the Hudson River", Feb 26th, 2001, located at http://www.oag.state.ny.us/press/statements/epa.html accessed on March 23, 2006

[77] EPA Website – New Source Review Home Page, located at http://www.epa.gov/nsr/ accessed on February 7, 2006

[78] Elliot DE, "NSR: An Industry Lawyer's Perspective on the Ongoing Battle Over Who Speaks for EPA", The Metropolitan Corporate Counsel, NE Edition, April 16, 2004, p.20

> "…took American industry by surprise. Maintenance and repair decisions made according to predictable and consistently enforced EPA guidelines were suddenly and retroactively challenged by EPA as unlawful. As a result, businesses delayed implementing current and future maintenance and repairs, uncertain as to whether New Source Review regulations would be applied to them. Efforts to improve the efficiency of industrial facilities and reduce pollutant emissions were being postponed until more reliable enforcement standards could emerge."[79]

The Bush Administration has pressured the EPA to make changes to the NSR to reduce the instability that utility companies have felt since the Clinton-era NSR modifications. The changes would read that new pollution controls would not have to be implemented if replacement costs did not exceed 20% of the cost of the 'process unit', even if increased emissions result[80].

Environmentalists argue that Bush Administration changes are weaker with respect to pollution standards, and that they have been relaxed to cater to political relationships. Nat Mund, of the Sierra Club, states that the new NSR would allow an old plant to refurbish so that, "it does not release more pollution per hour, but could double the operating time, thus releasing more pollution over the course of the year"[81]. The Natural Resources Defense Council believes that the new definition would "allow more pollution from approximately 17,000 industrial facilities across the country"[82]. Environmentalists believe that the Bush administration is catering to the energy industry because they contribute graciously to the party's campaign fund. The NRDC maintains that the same companies currently being prosecuted for NSR violations are, "major contributors to the Republican Party and had easy access to Vice President Cheney's secret energy task force"[83].

Proponents of the Bush Administration modifications argue that the changes are 'clarifications' to arbitrary definitions. The arbitrary definitions and guidelines of the NSR caused many power plants to delay repair and maintenance work, because they did not understand how such work was regulated by the NSR. Then Chief EPA Administrator, Christie Whitman stated, "The steps we are taking today recognize that some aspects of the NSR program have deterred companies from implementing projects that would increase energy efficiency and decrease air pollution"[84]. The EPA believes that pollution reductions, not increases will be the result of the new NSR clarifications. Donald Elliott, General Counsel of the EPA, believes that the Bush Administration's clarifications, "attempt to restore the stability and predictability that is necessary to maintain the reliability of our electricity supply…"[85] Scott Segal, director of the Electric

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[79] Heartland Institute Website - Taylor JM, "EPA Restores Flexibility to New Source Review" located at http://www.heartland.org/Article.cfm?artId=11300 accessed February 7, 2006

[80] Drew & Oppel Jr., "Lawyers at E.P.A. Say it will Drop Pollution Cases", New York Times, Nov. 6th, 2003, Section A, Column 6, National Desk, p. 1

[81] "Blumenthal to challenge Bush power plant proposal", The Associated Press State and Local Wire, October 17, 2005, Monday, BC Cycle, New Haven, Conn.

[82] Natural Resources Defense Council Website - "Bush Administration to Gut Clean Air Act", located at http://www.nrdc.org/media/pressreleases/030822.asp accessed February 7, 2006

[83] IBID, NDRC Website

[84] Heartland Institute Website - Taylor JM, "EPA Restores Flexibility to New Source Review" located at http://www.heartland.org/Article.cfm?artId=11300 accessed February 7, 2006

[85] Elliot DE, "NSR: An Industry Lawyer's Perspective on the Ongoing Battle Over Who Speaks for EPA", The Metropolitan Corporate Counsel, NE Edition, April 16, 2004, p.20

Reliability Coordinating Council believes without Bush's reforms the current rule would, "delay efficiency improvements…at the heart of effective emissions control"[86]

In March of 2006 a federal appeals court in Albany, NY blocked the EPA from easing the new source review clean-air rules on aging power plants. The court unanimously decided that only Congress could change the provisions of the Clean Air Act. They also maintained that the EPA had relied on "Humpty Dumpty" reasoning in arriving at their rule to relax enforcement of the law intended to reduce industrial air emissions. New York Attorney General Elliot Spitzer stated that, "This is an enormous victory for clean air and for the enforcement of the law, and an overwhelming rejection of the Bush administration's efforts to gut the law…it is the rejection of flawed policy."[87]

The NSR issue reflects the controlling power that an executive administration can have over the EPA. The Democratic Clinton Administration changed the NSR to be stricter on polluters, but resulted in complicating incoherencies. The Republican Bush Administration tried to change the NSR to be more accommodating to industry, while sacrificing environmental protection for economic stability. The agenda of each successive Presidential administration affects the operations and directives of the EPA. The EPA is left to vacillate in the 'tides of administrations', while environmental protection is inhibited. Environmental rights have the potential to act as a buoy and compass on which the EPA can float and guide itself as Presidential administrations come and go.

Congressional contribution to EPA failure

Congress has two basic ways in which it can attempt to control the bureaus that make up the government[88]. First, Congressional oversight committees can scrutinize the operation of an agency. This monitoring enables Congress to obtain information critical in making judgments. Negative judgments lead to punishment or corrective actions against the agency, to curtail unwanted behavior. Congressional oversight happens *ex post*, after the agency has implemented a policy or program. The second form of power Congress has over the bureaucracy is through statutory control. Statutory control is established during the legislation of an agency's mission. Statutory control enables Congress to shape and design the structure and processes of the agency. Doing so allows some groups and processes to be favored and others to be subordinated. Statutory control happens *ex ante*, before any policies or programs are implemented. Within statutory control there are varying degrees of power exerted. A high degree of statutory control means that an agency's structure, procedures, and agenda are detailed by Congress. An agency framed under a high degree of statutory control will function to meet the goals set by Congress. A low degree of statutory control means that an agency is afforded freedom in establishing its structure and processes. A low degree of statutory control enables an agency to have substantive discretion over policy, allowing it to determine its own agenda and resource allocation[89]. The members of Congress determine the mix of statutory control and oversight imposed on an agency.

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[86] Los Angeles Times Website – "Court Rejects EPA 's Loosening of Air Rule", March 18, 2006, located at http://www.latimes.com/news/nationworld/nation/la-na-epa18mar18,1,6937923.story?coll=la-headlines-nation accessed on March 21, 2006

[87] CNN Website – "Court blocks EPA from easing pollution rules", March 17, 2006, located at http://www.cnn.com/2006/LAW/03/17/epa.suit.ap/index.html accessed on March 21, 2006

[88] Bawn K, "Choosing Strategies to Control the Bureaucracy: Stautory Constraints, Oversight, and the Committee System.", Journal of Law, Economics and Organization, 1997, V.13, No. 1, p.101

[89] IBID, Bawn p.107

Kathleen Bawn suggests that, "The degree of legislative influence on agency decisions, and the ways in which it occurs depend on the costs and benefits generated for individual legislators[90]. Bawn believes that, "The mix of two strategies optimal for individual members of Congress often will not be optimal for society."[91] Bawn's assertions indicate that Congressional control over the EPA may, or may not be motivated by interests other than environmental protection for the optimization of societal welfare. Spulber and Besanko explain that, "There is a trade-off between the benefits of control imposed through statutory constraints and the benefits obtained from allowing the agency the discretion to respond to new information."[92] This point acknowledges the possibility that the high degree of statutory control imposed on the EPA may inhibit the agency from anticipating, responding, and dealing with new problems and information regarding environmental issues.

Cong. Oversight

Congressional oversight is a method used by Congress to conduct inquires or investigations of the executive branch. The executive branch appoints the Chief EPA Administrator, and that Chief is responsible to the president. Since the executive has considerable power and influence over the EPA, oversight into executive directives and resulting EPA operations is an important process in the checks and balance system. Lazarus describes the relationship of Congress and the EPA in that, "Congress appears to engage in more intense and pervasive oversight of EPA than it does of other agencies. In addition, the character of Congressional oversight of EPA appears to be consistently adversarial and negative."[93] Congressional oversight has contributed to the fragmentation and failures of the agency. These contributions have come in the form of inconsistencies between statutory goals and oversight criticism. This disconnect could be attributed to inputs from the executive branch that undermine the goals of Congressional statutes. They could also be the result of improper goal setting.

Congressional oversight committees often criticize the EPA for not meeting legislated goals. However, the goals set by Congress are often unrealistic in scope and budget. Congress has undermined the EPA by setting goals without allocating proper budgetary funds or identifying pathways of implementation and enforcement. Congress has been skeptical of the CBA requirements imposed on the EPA by the executive branch[94]. However, Congressional oversight has done little to curtail CBA requirements. In the past, Congressional oversight committees have explored the controlling relationship the executive and particularly the OMB have over the EPA. Despite these Congressional concerns, prescriptive legislation to emancipate the EPA has never been sought. Some have argued to have the agency elevated to Cabinet-level status, but these efforts have not been successful. Environmental legislations enacted by Congress are often quickly and poorly constructed as, "lawmakers compete to impress a poorly

Symbolic Regs.

[90] IBID, Bawn p.120
[91] IBID, Bawn p.120
[92] Spulber & Besanko, "Delegation, Commitment, and the Regulatory Mandate", Journal of Law, Economics, and Organization, 1992, Vol.8, No.1, p.152
[93] Lazarus RJ, " The neglected question of Congressional oversight of EPA: Quis Custodiet Ipsos Custodes (who shall watch the watchers themselves)?" Law and Contemporary Problems, 1991, Vol 54 Issue 4, p. 206
[94] McKay, MB, "Environmental Rights and the US System of protection: why the US Environmental Protection Agency is not a rights based administrative agency", Environment and Planning A, 1994 Vol. 26, pg. 1775

informed public with the strength of their symbolic commitments"[95]. Symbolic environmental legislation that includes poorly defined terms (Clean Air Act), excessive obligations, conflicting goals with other environmental legislation, and insufficient budgeting, all have led to the fragmentation of the EPA. This Congressionally imposed fragmentation has resulted in consistent regulatory failures and corresponding controversy, rendering the EPA impotent and undependable in many crucial environmental matters.

Judciary contributio n to failure

The early 1970's showed a trend in the courts of trying to protect environmental interests[96]. The judiciary led the nation in the recognition of rights, but failed to recognize a Constitutional right to a clean or non-hazardous environment. Judge McGowan in Weyerhauser Co. v. Costle (1978) stated, "Hitherto the right of the polluter was pre-eminent…Henceforth, the right of the public to a clean environment would be pre-eminent" and that this view was, "based on the widely shared conviction that the nation's quality of life depended on its natural bounty, and that it was worth incurring heavy cost to preserve that bounty for future generations"[97] This brief movement was not strong enough to promote the amending of the U.S. Constitution with an environmental rights provision.

The administrative law rulings of the courts often determine the winner of the power struggle over agency control between the executive and Congressional branches of government[98]. The courts are less predictable and less centralized than the executive or legislative branches of government. However, the executive branch does have a certain amount of influence on the U.S. Supreme Court through nomination of Supreme Court Justices, but Congress must approve those judges. Yet, executive appointees of qualified conservative, liberal or swing judges can tip the ideological balance of the court long after the executive administration is out of office. Conservative Supreme Court justices appointed by President Bush could tip the balance against many environmental cases heard by the court. An example of this is that one day after conservative Chief Justice John Roberts was confirmed, the Supreme Court agreed to hear two new cases brought by developers challenging the reach of the Clean Water Act. Some fear the new eagerness of the court to address these questions, about how far upstream Congress has the authority to regulate, will give leniencies to polluters[99]. Samuel Alito, another justice appointed by Bush, has also worried environmentalists. Alito is expected to have a hard stance on the reach of Congress with respect to environmental regulations and holds conservative views on who can bring a lawsuit to court for environmental claims (standing)[100]. Judges are able to make decisions based on the specifics of each case and existing legal precedence. Judicial attitudes are not static across the judiciary, as new judges are always entering the system. Some judges may be more receptive to the

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[95] Elliot ED et al, "Toward a theory of statutory evolution: the federalization of environmental law." Journal of Law, Economics and Organization, 1985, Vol. 1, p. 328

[96] OpCit, McKay p. 1765

[97] IBID, McKay p. 1766 footnotes

[98] Spulber & Besanko, "Delegation, Commitment, and the Regulatory Mandate", Journal of Law, Economics, and Organization, 1992, Vol.8, No.1, p.153

[99] NPR Website – "A Future Legal Battleground: Environmental Regulation", NPR Morning Edition, Jan 12, 2006, located at http://www.npr.org/templates/story/story.php?storyId=5151084 accessed on April 5, 2006

[100] IBID, NPR Website

opinions of those who appointed them and some may not. However, Presidential appointees usually reflect the same ideology as the administration. An example of this is a study by Kovacic that examined judicial decisions regarding the Clean Air and Clean Water Acts in the Reagan and Carter Administrations from 1977-1990. This study found that the Reagan-era appointed judges supported more industrial friendly outcomes compared to the Carter appointees and the Carter-era appointees supported more environmentally friendly outcomes compared to the Reagan appointees[101].

In the early stages of the EPA the courts applied the 'hard-look' doctrine to make sure agency decisions were in line with statutory framework and to minimize agency capture[102]. The hard-look doctrine "demanded that the agency accompany its decision with a clear explanation of the factors considered, the weights assigned to them, and the reasons they dictated the decision ultimately adopted"[103] The hard-look doctrine was an incentive for the EPA to stick to statutory objectives, since it provided considerable legal due diligence. The hard look doctrine still applies to many EPA regulations, however it is limited in many ways. Specifically, judges are presented information on both sides of the case and are expected to take a hard look at the available information. They are expected to have a degree of command over the subject at hand, and to use that knowledge to assess the information in an unbiased manner. In the case of environmental regulations this can be a hard task since the subject matter often requires complex scientific and technical knowledge. According to Wald, in addition to the lack of specialized technical knowledge, "There are several barriers to the ability of a judge to learn the facts necessary to an adequate review of the agency decision: oral argument, communication barriers, limited access to other sources of information, and matters of perspective."[104] Limitations of the courts to analyze specialized information may impair or distort the hard look doctrine. This is because the executive-led EPA administrators, to justify a regulation, can undermine scientific knowledge. The hard look doctrine insures that agency regulations are in line with Congressional statutes, however, the viability of the underlying science is not examined.

Several court decisions may appear to be pro-development and anti-environmental. Beginning in *International Harvester Co. v. Ruckelshaus* (1973) where the D.C. Circuit Court overturned the EPA's decision not to extend an emissions reduction deadline on the grounds that they were not considering the economic consequences. Other cases were seen as granting the EPA more power as an agency. In *Chevron U.S.A v. Natural Resources Defense Council* (1984) the courts decided that when a question arises that is not specifically addressed by Congressional statute, the court should favor the decision made by the agency. This rational stemmed from the court's belief that the EPA had more expertise in environmental matters than the court. The *Chevron* case, while siding in favor of the EPA's decision, illustrated the lack of

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[101] Kovacic WE, "The Reagan Judiciary and Environmental Policy: The Impact of Appointments to the Federal Courts of Appeals", Boston College Environmental Affairs Law Review, Vol. 18, p. 713

[102] McKay, MB, "Environmental Rights and the US System of protection: why the US Environmental Protection Agency is not a rights based administrative agency", Environment and Planning A, 1994 Vol. 26, pg. 1776-77

[103] Glicksman RL, "A retreat from judicial activism: the Seventh Circuit and the environment", Chicago-Kent Law Review, 1987, Vol. 63, p. 223

[104] Wald PM, "Judicial Review of Complex Administrative Agency Decisions" Annals of the American Academy of Political and Social Science, Vol. 462, July 1982, p.79

authority the judiciary was willing to take in matters where legislative rulemaking was unclear. This is problematic because, conceivably, the EPA decision could have been based on pro-development direction from the executive branch that undermined the goals of the Congressional statute. If Congress enacted a law that was unclear, the executive branch could subvert that goal through the EPA Chief and reach an end unintended by Congress. The *Chevron* court, instead of choosing to interpret the law set up by Congress, gave power to the EPA. If the EPA were an autonomous agency the *Chevron* decision would not be problematic. However, *Chevron* illustrated how the court failed their check and balance duties. Had the EPA's decision been directed by political pressure from the executive, instead of objective science, the courts would have failed to check this abuse of power. Still, other cases were seen as judicial attempts to directly going against Congressional statutes. In *Gwaltney of Smithfield, Ltd V. Chesapeake Bay Foundation Inc* (1987) the Supreme Court decided to limit citizen suits by tightening standing requirements. Congress had intended citizen suits to "operate both to spur and supplement government enforcement actions".[105] This provision allows citizen suits to invoke action through the EPA. The *Gwaltney* Supreme Court interpreted the Congressional statute in a minimalist manner, allowing citizen suits only a "supplementary role"[106].

More recently John Adler suggest that the EPA itself is a faulted agency, in desperate need of internal reform and external reform from all branches of government[107]. Adler points out that the EPA has become an exception to the rule that courts generally defer to agency decisions. This is opposite of the 1984 *Chevron* case outcome discussed above, where the court did defer to the EPA decision. Adler states that in the late eighties the EPA has lost the majority of cases filed in the primary court of jurisdiction for challenges to environmental regulations. The EPA record is substantially lower than that of federal agencies as a whole, in the U.S. Court of Appeals for the D.C. Circuit (where most federal agency cases are heard). According to Adler, Federal courts will generally only overturn a federal agency's regulation if 1) the regulation is unlawful, 2) the regulation is arbitrary and capricious or an abuse of discretion, or 3) the regulation was not issued in accordance with procedural requirements[108]. While a synopsis of Adler's EPA case review is beyond the scope of this chapter, he does state that the unifying theme in many of these overturned judgments reveals that, "the court has found the EPA acting with little regard for the limits or obligations of its statutory authority, and with little regard for the need to explain the basis for its decisions. The result is an agency with minimal accountability to the legislature and, more importantly, to the people."[109]. Adler goes on the state that the agency too often gives political goals and policy expedience priority over meeting Congressional goals, irrespective of whether

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[105] Senate Report 1985, Number 50, 99th Congress of the United States of America, 1st Session, 1985
[106] McKay, MB, "Environmental Rights and the US System of protection: why the US Environmental Protection Agency is not a rights based administrative agency", Environment and Planning A, 1994 Vol. 26, pg. 1779
[107] The Reason Foundation Website – "Environmental Performance at the Bench: The EPA's Record in Federal Court" by Jonthan Adler, 2000, located at http://www.reason.org/ps269.html accessed on February 8, 2006
[108] IBID, Adler, Executive Summary
[109] IBID, Adler, Part 3A

those goals make sense[110]. Adler claims that problems with the EPA are the result of multiple factors including the agency's internal structure, staff competence, Congressional statutory mandates, and over zealousness of politically appointed EPA leaders.

The executive, legislative and judicial branches of government all exercise considerable control over the EPA. It is clear that although Congress sets goals for the EPA, the executive branch has the most control over the operations and directives of the agency. Because of the high level of correlation between executive administration ideology and judicial outcomes, the power of the executive branch can be magnified. Without a Constitutional environmental right at the foundation of the agency, politics often dominates protection. Numerous controlling entities exerting pressure and control on the agency have resulted in numerous regulatory failures. The inability of the agency to successfully protect the environmental has resulted in public distrust. These realities all point to a need to increase the independence of the EPA, in order to enable it to perform more effectively.

Political Pressure Undermining Environmental Protection

There are many examples of political agendas weakening environmental regulations. In the absence of a Constitutionally granted environmental right, political whims are much more likely to dilute environmental policy. The Bush Administration has performed many anti-environmental actions. This section will focus on their efforts to undermine climate change science, change the Clean Air Act, slow the Superfund process and relax the enforcement of environmental laws through strict budget cutting of the EPA.

James Hansen, head of NASA's Goddard Institute for Space Studies, told 60 Minutes that the Bush Administration White House is restricting whom he can talk to and what he can say about climate change[111]. Hansen believes that global warming is accelerating due to human activity, and maintains that humans have only 10 years to reduce greenHouse gases before global warming reaches a tipping point and becomes unstoppable. The White House informed Hansen that all press releases would have to go through them first, frequently being edited by lawyers and politicians with no science backgrounds. Former American Petroleum Institute lobbyist and current chief of staff for the White House's Council on Environmental Quality, Phil Cooney, edited portions of Hansen's data. Some of these changes included editing, "earth is undergoing rapid change" to read "may be undergoing change", "uncertainty" was changed to "significant remaining uncertainty", and a line saying "energy production contributes to warming" was completely crossed out[112]. Hansen went public about the White House's, "…willingness to listen only to those portions of scientific results that fit predetermined inflexible positions" because he felt it was a recipe for disaster.[113] A TIME Magazine

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[110] IBID, Adler, Conclusion
[111] CBS News Website – "Rewriting The Science", Scott Pelley March 19, 2006, located at http://www.cbsnews.com/stories/2006/03/17/60minutes/main1415985.shtml accessed on March 30, 2006
[112] IBID, CBS News Website
[113] IBID, CBS News Website

cover story confirmed that most scientist do believe that global warming is accelerating, bolstering Hansen's claims[114]. Due to unexpected feedback loops, tipping points, and thresholds of natural systems, "Things are happening a lot faster than anyone predicted", stated Bill Chameides, the chief scientist for the advocacy group Environmental Defense[115]. To make matters worse the system of checks and balances seems to be failing as the Republican dominated Congress has resisted efforts by Senators Joe Lieberman and John McCain to even mildly limit carbon. Mounting evidence indicates that global warming is a problem that is getting worse, yet the efforts of a single political administration can delay pivotal national leadership. The system of checks and balances has so far not been able to curtail the agenda to deny science. The result is exposing the citizens of the United States, and the populations of the world, to greater risk with respect to global warming.

Air pollution is a significant problem in the United States. Numerous studies have found that acute and chronic morbidity and mortality outcomes occur in association with particulate matter concentrations at common and relatively low pollution levels. One study asserts that this trend will remain a serious public health concern until the U.S. EPA moves to revise its currently inadequate PM standards[116]. Other pollutants like ground level ozone, black carbon soot, smog, mercury emissions, nitrogen and sulfur oxides, etc also pose great risks to human health, environmental quality, and global climate stability. Acting in opposition to these realities, the Bush Administration has proposed the Clean Skies Initiative, which will serve to amend the Clean Air Act requirements. The Clean Air Act (CCA) requires power plants to significantly reduce the amounts of soot-forming sulfur dioxide (SO_2) and nitrogen oxide (NO_X). In September of 2001, the EPA informed the industry's leading lobby group, Edison Electrical Institute (EEI) that the CCA would force power plants to cut SO_2 emissions from 10 million tons in 2001 to 2 million tons in 2012 and reduce NO_X from 5 million tons in 2001 to 1.25 millions tons by 2010[117]. Various sources assert that the Clear Skies Initiative would allow more than twice as much SO_2 for nearly a decade longer (2010-2018), more than one and a half times as much NO_X for nearly a decade longer (2010-2018) and would create 'banking' provisions that could make further reductions delayed to as late as 2025[118]. These pushed back targets are also one and a half times greater for SO_2 than the original CCA would allow and one third greater for NO_X.

Toxic mercury emissions will also be relaxed under this plan. Power plants are one of the largest sources of mercury, a neurological toxin harmful to many segments of the population. The CCA currently requires that power plants implement the maximum

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[114] Kluger J, "Global Warming: Be Worried. Be Very Worried", TIME Magazine, Vol. 167, No. 14, April 3, 2006

[115] IBID, Time Magazine

[116] Colburn KA, Johnson PRS, "Air Pollution Concerns Not Changed by S-PLUS Flaw", Science, Vol. 299, no. 5607, Jan 31st 2003, p.665-666

[117] National Resources Defense Council Website – "Administration Plan Repeals, Weakens and Delays Clean Air Act Safeguards", located at http://www.nrdc.org/air/pollution/fclearsk.asp accessed on March 22, 2006

[118] A few examples are the Carnegie Council on Ethics and International Affairs Website – "Environmental Protection in the United States: A Right, a Privilege, or Politics?" Aimee Christensen, Human Rights Dialogue 2.11 (Spring 2004) located at http://www.carnegiecouncil.org/viewMedia.php/prmTemplateID/8/prmID/4439 accessed on March 22, 2006 ~ or~ the National Resources Defense Council Website referenced above

achievable technology (MACT) to control mercury emissions and other various air pollutants by 2007. In 2001 the EPA told EEI that the CCA would force power plants to reduce mercury pollution by 90%, from 48 tons in 2001 to 5 tons by 2008. The Bush Administration's plan would allow 5 times more mercury emissions by power plants for almost a decade longer (2010 to 2018) and three times as much after 2018 than the existing CCA allows. In 2003, 44 states had advisories in effect for non-commercial fish, 17 states had state-wide mercury advisories, 9 states had statewide advisories for mercury in their coastal waters, and the Food and Drug Administration had reiterated its warning to women of childbearing age to avoid eating certain types of fish that have high levels of mercury[119]. The Clear Skies Initiative also aims to transfer some power away from the states, especially regarding the right to sue other states from cross-boarder pollution and the right of states to enact stricter environmental standards then the federal government.

The Bush Administration claims that the Clear Skies Initiative will "cut air pollution by 70%, using a proven, market-based approach that will save American consumers millions of dollars.[120]" The Bush Administration claims that SO_2 emissions will be cut by 73%, from 11 million to a cap of 4.5 million in 2010 and 3 million tons in 2018. NO_X will be cut 67% from 5 million tons to a cap of 2.1 million tons in 2008, then to 1.7 million tons in 2018. Mercury emissions will be cut 69% from 48 tons to a cap of 26 tons in 2010 and 15 tons in 2018[121]. The Bush Administration relies on the market-based 'cap and trade' system as opposed to the old 'command and control' method to achieve these goals. The administration relies on financial incentives created by allowing power plants to sell allowances earned from pollution efficiency. This market-based approach is supposed to give power plant owners incentives to reduce emissions while allowing flexibility to find the most cost effective cleanup strategies. The Bush-led EPA asserts that the Clear Skies Initiative will result in 14,100 fewer premature deaths, 8,800 fewer cases of chronic bronchitis, 30,000 fewer hospitalizations due to cardiovascular/respiratory symptoms, and 12.5 million fewer days with respiratory illness[122]. The EPA states that Clear Skies will result in a $113 billion annual benefit by 2020, while incurring costs of only $6.3 billion[123]. The EPA also believes Clear Skies will help reach the National Ambient Air Quality Standards (NAAQS) by 2020 (based on initial modeling) while reducing nitrogen deposition, fine particle concentration, sulfur deposition, decreases in mercury deposition and slowing chronic acidity in many areas[124].

In 2005 the Clear Skies Initiative, now called the Clear Skies Act of 2005 reached a 9-to-9 vote in the Senate Committee on Environmental and Public Works. This means that the bill cannot advance to the full Senate. Opponents of the bill believe its mandates will weaken the CCA and do not have provisions for decreasing CO_2 emissions.

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[119] Carnegie Council on Ethics and International Affairs Website – "Environmental Protection in the United States: A Right, a Privilege, or Politics?" Aimee Christensen, Human Rights Dialogue 2.11 (Spring 2004) located at http://www.carnegiecouncil.org/viewMedia.php/prmTemplateID/8/prmID/4439 accessed on March 22, 2006

[120] White House Website – "Executive Summary – The Clear Skies Initiative", February 14, 2002, located at http://www.whiteHouse.gov/news/releases/2002/02/clearskies.html accessed on March 22, 2006

[121] IBID, White House Website

[122] EPA Website – "Clear Skies Initiative - Health and Environmental Benefits", located at http://www.epa.gov/air/clearskies/benefits.html accessed on March 22, 2006

[123] IBID, EPA Website

[124] IBID, EPA Website

Supporters of the bill echo Republican Senator James Inhofe (Oklahoma) sentiments, "This bill has been killed by environmental extremists who care more about continuing the litigation-friendly status quo and making a political statement on CO_2 than they do about reducing air pollution"[125]

The Clear Skies Initiative and Clean Skies Act of 2005 illustrate the power the executive branch can have over environmental protection. The disparity between the executive branch's claims and environmentalist's criticisms shows how complex Presidential directives can be. The system of checks and balances prevented the president's bill from reaching the Senate floor. This reality could lead one to believe that the environmentally beneficial claims made by the White House may not have been accurate. Although this doesn't mean that everything environmentalists accused the bill of are true, it does suggest that the environmental benefits of the Clean Skies Act may have been overstated by the White House. The outcome of the committee proceeding may have been very different if there were a few more energy industry sympathizers on the panel. If the Clean Skies Act would have made it to the Senate floor there is no telling if it would have passed or not. This could depend on the composition and sympathies of the Senate at the time, the number of democrats and republicans, and if their sympathies lay with industry or the environment. While the executive branch does not have carte blanche power over environmental protection, the Clean Skies Initiative illustrates the considerable amount of power and influence it yields.

A Superfund site is any land in the United States that has been contaminated by hazardous waste and identified by the EPA as a candidate for cleanup because it poses a risk to human health or the environment. The EPA determines the level of pollution at a site through inspection and scoring on the Hazard Ranking System (HRS). The HRS rank determines whether a site is put on the National Priorities List (NPL). Only sites on the NPL are considerations for Superfund, therefore, Superfund sites are the most contaminated sites in the country. One in four Americans lives only a short bike ride away from a Superfund Site, according to the Sierra Club[126]. The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) set up the Superfund Law and Congress set up the Superfund Trust in 1980. The Superfund Trust helps pay for contamination cleanup when potentially responsible parties cannot be located. The legal authorization for the Superfund trust, which includes taxes on businesses to pay for toxic cleanups, expired in 1995 under the Clinton Administration. Clinton annually urged the Republican-controlled Congress to reauthorize full funding, but his attempts failed. The Bush Administration has not pursued reauthorization, instead choosing to shift the burden to the taxpaying public through increases in general tax revenues.

Congressional critics say that Bush is abandoning the "polluter pays" principle by making the public clean up the messes made by various industries. Currently, the Superfund Trust is millions of dollars short of the amount needed to stay on cleanup

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[125] MSNBC Website – "Bush gets burned in Senate on emissions", March 9, 2005, located at http://msnbc.msn.com/id/7139531/ accessed on March 22, 2006

[126] The Sierra Club – "Bush Administration Admits to Leaving Communities at Risk from Toxic Waste in 2003", Jan 8 2004, located at http://www.sierraclub.org/pressroom/releases/pr2004-01-08.asp accessed on March 22, 2006

schedule. The Bush Administration has selected 33 toxic waste sites in 18 states for financial cuts under the Superfund law. The Environmental Defense Organization tabulates these cuts to amount to about $227.9 million[127]. Environmentalists assert that the Bush Administration is also exempting military bases and the defense industry from much of their liability associated with toxic waste cleanup on the grounds that the exemptions are needed for proper training and military readiness. Of the 158 sites on the NPL, the Department of Defense (DOD) is responsible for 129, with costs totaling up to $14 billion[128]. Ray Clark, the Assistant for Environment with the Army stated that, "The armed services have a history they can be proud of", asserting that from Nixon to Clinton military leaders have been given the responsibility to balance military readiness with environmental protection[129]. Clark believes that, "This administration is a departure from that value set.[130]". Environmentalists maintain that the actions to increase the public's responsibility for toxic waste cleanup and lack of support for Superfund reflect the Bush Administration's affinity for corporations and industry.

The Bush administration admits that the annual Superfund completions are down somewhat from recent years. They claim that this is because a few megasites are eating up a large percentage of the annual budget, resulting in fewer but more significant cleanups per year[131]. The Bush Administration also claims that Congress, not the executive branch has reduced the Superfund budget[132]. Regarding the Bush Administration abandoning the "polluter pays", an EPA representative stated that the amount of money recently collected from responsible parties is in line with the EPA's record over the past decade[133]. The Bush Administration also believes the Superfund process wastes money on lengthy litigation to force responsible parties to pay.

In 2004 Senators Boxer and Jeffords and House Representatives Dingell and Solis made an inquiry to the EPA about Superfund. The result was a report by the EPA's Inspector General admitting that the Bush administration has failed to adequately fund the cleanup of hazardous waste sites in fiscal year 2003[134]. This resulted in leaving many communities around the country at risk from toxic contamination, instead of holding polluting companies accountable[135]. In 2001, the budget for Superfund was $860 million, in 2002 it was reduced to $427 million, and in 2003 it was only $28 million[136].

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[127] Environmental Defense Website – "EPA to Cut Superfund Cleanup Program", July 7, 2002, located at http://www.environmentaldefense.org/article.cfm?contentid=2165 accessed on March 22, 2006

[128] Environmental Science and Technology Online – "Are environmental exemptions for the U.S. military justified?", September 22, 2004, located at http://pubs.acs.org/subscribe/journals/esthag-w/2004/sep/policy/pt_military.html accessed on March 22, 2006

[129] IBID, ESTO Website

[130] IBID, ESTO Website

[131] EPA Website – Office of the Administrator, "Remarks by Marianne Lamont Horinko – American Bar Association/Environment Section", October 9 2003, located at http://yosemite.epa.gov/administrator/speeches.nsf/cb7284cd464285f885256457006faf39/667cab307bd5ce8f85256dbf0060d1db!OpenDocument accessed on March 22, 2006

[132] IBID, EPA Website

[133] IBID, EPA Website

[134] The Sierra Club – "Bush Administration Admits to Leaving Communities at Risk from Toxic Waste in 2003", Jan 8 2004, located at http://www.sierraclub.org/pressroom/releases/pr2004-01-08.asp accessed on March 22, 2006

[135] IBID, Sierra Club

[136] CNN Website – "White House won't tax corporations for Superfund Cleanup", Feb 24 2002, located at http://archives.cnn.com/2002/ALLPOLITICS/02/24/bush.superfund/ accessed on March 22, 2006

The Bush Administration's continuing downward pressure on the Superfund program illustrates how political agendas of an administration can negatively affect environmental policy.

The Bush Administration has proposed to reduce funding for environmental programs and the EPA consistently. These cuts have decreased the agency's ability for the agency to enforce environmental laws and have undermined the nation's environmental protection. Bush's first budget cut was for fiscal year 2002. Bush proposed to cut spending on environmental programs by $2.3 billion, which including funding to implement the Kyoto Protocol and $190 million for research into renewable energy[137]. Direct funding for the EPA was asked to be reduced by 6.5%, approximately $500 million. White House budget director, Mitch Daniels, stated that the EPA cuts would not affect core EPA programs and that no EPA employees would lose their jobs[138]. Bush's FY 2003 proposed budget cuts eliminated more than 200 inspection and civil enforcement staff jobs between 2001 and 2003, cutting the federal workforce by 13%[139]. Bush had proposed more extreme cuts, but Congress rejected such proposals. This reduction in enforcement staff could send a message to polluters that environmental laws will loosely be enforced, thus possibly reducing compliance.

The Office of Management and Budget states that the EPA's proposed operating budget for FY 2004 would increase by 7%, which provides the highest funding levels ever to implement core environmental programs, including the operating program and state grants[140]. However, a House of Representatives document states that the proposed 2004 budget would reduce EPA funding by $500 million, resulting in 5,000 fewer inspections than in 2000, and forcing taxpayers to pay up to 80% of the costs associated with Superfund toxic cleanups[141]. The proposed FY 2005 increased the EPA's budget to $7.76 billion total, a $133 million increase from 2004. In 2005 Congress had appropriated $8.4 million for the EPA. An $8 billion budget was the middle-ground figure reached for the EPA's 2005 operating budget, a $342 million decrease from 2004[142]. Then EPA Administrator, Mike Leavitt, stated that the budget allocates, "substantially more money than prior years"[143]. The FY 2006 budget proposed to decrease the EPA's operating budget 6%. There was also a 40% proposed decrease in grants to state and local governments for water conservation. The administration's FY 2007 budget proposal decreases the EPA operating budget by 4.1%, about $310 million.

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[137] CNN Website – "Bush budget trims EPA, boosts education, defense", April 9, 2001, located at http://archives.cnn.com/2001/ALLPOLITICS/04/09/bush.budget.03/ accessed on March 22, 2006

[138] IBID, CNN

[139] Rockefeller Family Fund organization Website – "The Withering Away of Environmental Enforcement: The Bush Administration's Shell Game", June 13 2002, located at http://www.rffund.org/eip/docs/attachmentA.pdf accessed on March 22, 2006

[140] Office of Management and Budget Website – "Environmental Protection Agency", Located at http://www.whiteHouse.gov/omb/budget/fy2004/epa.html accessed on March 22, 2006

[141] House of Representatives Website – "Bush Credibility Gap: The 2004 Budget", House Appropriations Committee, located at http://www.House.gov/appropriations_democrats/pdf/budgetvsreality.pdf accessed on March 22, 2006

[142] American Association for the Advancement of Science Website – "EPA R&D Falls in 2005 Budget Squeeze", located at http://www.aaas.org/spp/rd/epa05c.pdf , accessed on March 23, 2006

[143] Forbes Magazine Website – "Bush budget cuts environmental funding by 7 pct", Chris Baltimore, Feb2 2004, located at http://www.forbes.com/business/newswire/2004/02/02/rtr1238635.html accessed on March 22, 2006

This includes an 80% decrease in funding for the agency's database library budget from $2.5 million to $500,000. Congress has consistently acted to limit the intensity of the cuts proposed by Bush. In fact, in almost every year Congress has allocated the EPA more money then the president has proposed.

Congressional and judicial limitations of executive power are at the heart of the idea of checks and balances. If Congress was more sympathetic to the president's proposed EPA budget cuts, the EPA and environmental protection in the United States could have incurred even more losses. Perhaps a Republican controlled House and Senate would yield more affirmations for a Republican president's budget proposals, perhaps not. An environmental right would further insulate environmental protection and the EPA from passing political whims and failures of the checks and balances system. Aimee Christensen expresses this sentiment by saying,

> "Those who advocate a Constitutional right to a healthy environmental seek to use the country's highest law to place environmental protection above political pressure, to ensure that the rights to health and a healthy environmental are formally incorporated into the concept of due process – in short, to live up to the Declaration of Independence's inalienable rights to life, liberty and the pursuit of happiness."[144]

The examples detailed above illustrate how one administration has served to undermine environmental protection efforts. The Bush Administration is not the first presidency to make the environment a relatively low priority. Arguably, the Bush Administration has built one of the worst environmental records to date, compared to some of his recent predecessors. There are many historical instances of political pressure from the executive branch trying to undermine environmental protection efforts, some of which are discussed earlier in this chapter. However, the Bush Administration examples are used to convey the current issues and relevant politics of an anti-environmental administration.

Cost of Regulation

The largest barrier to enacting an environmental right in the United States is cost. Environmental protection through regulations has a significant cost impact on all areas of the economy. A Constitutional environmental right would increase costs for consumers, businesses, and the government. Phasing in this right over time would help offset the burden of these cost. However, it is important to have an understanding of how environmental regulations have effected the economy in the past, to help forecast how an environmental right may affect the economy in the future. Industry and businesses often state that environmental regulations impose costs that put firms at a competitive disadvantage in the global economy. They further maintain that these increased costs will result in the loss of thousands of jobs for U.S. workers. Some studies show that environmental regulations do not harm and can even benefit firms. Yet many studies confirm the negative relationship between environmental regulations and economic viability for firms, workers and the U.S. economy.

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[144] Carnegie Council on Ethics and International Affairs Website – "Environmental Protection in the United States: A Right, a Privilege, or Politics?" Aimee Christensen, Human Rights Dialogue 2.11 (Spring 2004) located at http://www.carnegiecouncil.org/viewMedia.php/prmTemplateID/8/prmID/4439 accessed on March 22, 2006

A study by Jorgenson & Wilcoxen attempted to quantify the costs of pollution controls by measuring U.S. economic growth with and without environmental regulations[145]. They used the growth rate of the GNP from 1973 –1985, various economic assumptions and computer simulations to estimate the effects of environmental regulations on the economy. This study incorporated the affect of differences among industries in pollution abatement and the affects of environmental costs on capital formation. They conclude that mandated investment in pollution control equipment has had the largest impact, followed by motor vehicle emissions control, and increased operating costs resulting from pollution abatement. These three factors alone caused a .191 percentage point drop in GNP growth over the time period studied[146]. The authors also claim that the cost of emission controls is more than 10% of the total costs of government purchases of goods and services over this time period[147]. Some of the effects of environmental regulations that contributed to the growth slowdown include: decreases in production output (this effect is distributed unevenly across industries), lowering of long-run capital stock, and lowering long-run consumption[148]. One of the biggest problems with the study by Jorgensen & Wilcoxen is, at their own admission, they did not attempt to quantify the benefits of the improved environmental quality that resulted from the imposed regulations. The omission of quantifying positive environmental benefits is also apparent in standard U.S. government cost-benefit analysis. Benefits could be derived from reduced negative public health impacts (such as reduced infant mortality or decreased incidence of hospitalization for asthma), reduced future environmental liability to businesses if they comply with government standards, climate stability, decreased environmental degradation, better agricultural outcomes, increased property value, and improved environmental aesthetics, etc. Quantifying these benefits are extremely difficult because there is no actual market for these goods to determine their dollar value. A study by Jaffe et al cited EPA studies that estimate the 1995 annual cost of complying with EPA regulations exceeds $125 billion in the U.S. or about 2.1% of GDP[149].

A study by Greenstone examined the costs to industry and the economy from imposition of the Clean Air Act Amendments of 1970 and 1977[150]. This author suggests that from 1972-1987 counties that had not achieved the air quality standards mandated (non-attainment counties) lost approximately 590,000 jobs, $37 billion in capital stock and $75 billion of output in pollution intensive industries[151]. However a study of the effects environmental regulations have upon the manufacturing industry, by Jaffe et al, suggest that there is no evidence that environmental regulations negatively impact *most*

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[145] Jorgenson DW, Wilcoxen PJ, "Environmental regulation and U.S. economic growth", RAND Journal of Economics, Vol. 21, No.2, Summer 1990, p.314-340
[146] IBID, Jorgenson & Wilcoxen, p.338
[147] IBID, Jorgenson & Wilcoxen, p.314
[148] IBID, Jorgenson & Wilcoxen, p.338
[149] Jaffe et al, "Environmental Regulation and the Competitiveness of U.S. Manufacturing: What Does the Evidence Tell Us?", Journal of Economic Literature, Vol. XXXIII, March 1995, p.132-163
[150] Greenstone M, "The Impacts of Environmental Regulations on Industrial Activity: Evidence from the 1970 and 1977 Clean Air Act Amendment and the Census of Manufacturers", Journal of Political Economy, Vol. 110, No.6, Dec. 2002, p.1175-1219
[151] IBID, Greenstone

firm's competitiveness in the global market[152]. This is because for all but the most heavily polluting and heavily regulated industries (chemical manufacturers, electric utilities, petroleum manufacturers, etc), the cost of compiling with environmental regulations is very small. Additionally, studies indicate that the European Union has environmental regulations that are as stringent if not slightly more precautionary then the environmental regulations in the United States[153]. This fact further erodes the argument against environmental regulations decreasing a firm's international competitiveness, since many other competitive international players are subject to similar regulations. A Study by Gray measured the 30% manufacturing productivity slowdown that occurred in the 1970's due to OSHA and EPA regulations[154]. The findings of this study indicate that the affect from OSHA regulations was relatively strong and the affect of the EPA regulations was relatively weak[155]. This was mostly attributed to the high costs associated with OSHA compliance.

The Porter Hypothesis maintains that tough environmental regulations, in the form of economic incentives, can trigger innovation that can eventually increase a firm's competitiveness. The result of this long-term increased competitiveness may outweigh the short-term private costs of stricter environmental regulations[156]. The dominant argument behind this theory is that firms are not aware of certain opportunities and the imposition of environmental policy may make them look for and identify these opportunities[157]. Firms may then realize increased efficiency or improved organizational strategies that offer increased revenue or enhanced production possibility frontiers. The second argument of this theory states that firms create a first-mover advantage by adopting new technologies before the rest of the industry[158]. This results in a competitive advantage when other countries or the rest of the industry are forced to adopt similar technologies and incur associated costs. Jaffe refutes the claim that environmental regulations can make firms more competitive maintaining that, "…the evidence we have reviewed suggests that the truth regarding the relationship between environmental protection and international competitiveness lies between the two extremes of the current debate"[159]. This conclusion seems to be in line with most current scholarly evidence that suggests environmental regulations do not drastically reduce competitiveness or create a competitive advantage. While there are cases of individual firms experiencing reduced competitiveness and increased competitiveness due to the imposition of environmental regulations, no dominant trend emerges.

While individual firms and industries may not suffer greatly from environmental regulations, Jaffe et al maintain that there are significant long-run social costs to be borne

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[152] Jaffe et al, "Environmental Regulation and the Competitiveness of U.S. Manufacturing: What Does the Evidence Tell Us?", Journal of Economic Literature, Vol. XXXIII, March 1995, p.132-163
[153] Hammitt, Weiner et al, "Precautionary Regulation in Europe and the United States: A Quantitative Comparison", Risk Analysis, Vol. 25, 1215, October 2005
[154] Gray WB, "The Cost of Regulation: OSHA, EPA and the Productivity Slowdown", American Economic Review, Vol. 77, No. 5, Dec 1987, p.998-1006
[155] IBID, Gray, p.1005
[156] Xepapadeas A, "Environmental Policy and Competitiveness: The Porter Hypothesis and the Composition of Capital", Journal of Environmental Economics and Management, Vol. 37, p.165-182, 1999
[157] IBID, Xepapadeas, p. 166
[158] IBID, Xepapadeas, p. 166
[159] OpCit, Jaffe et al p.159

by increased regulation. These social costs will exceed private costs of compliance due to decreased productivity, reduce outputs, decrease investments, and create transition costs[160]. Additional social costs may be a reduction in jobs, decreased pressure for efficiency, decreased personal income and savings, and higher product prices. This illustrates how individual companies and industries will not be affected as greatly by environmental regulations as the aggregate economy. One study by Hazilla & Kopp points out that in 1981 Household expenditures for goods and services decreased by $43.6 billion after environmental regulations, however, leisure consumption increased by $14.6 billion[161]. This labor-leisure consumption trade-off can reduce the social costs associated with environmental regulations. However, this labor-leisure consumer response in not able to completely outweigh the entire burden of social costs associated with environmental regulations. There is a real and documented effect that environmental regulations have on the aggregate economy, which has used to be a measure of social cost. However, there are other social benefits that result from environmental regulations including improved health from less pollution, higher property values, improved aesthetics, etc, that must be factored in to offset social costs incurred.

R.H. Coase identifies the problem of social costs as a tradeoff. Does the private polluter have the right to pollute at the expense of the public or does the public have the right to regulations at the expense of the private polluter[162]. The cost of exercising the right to produce a product and correspondingly emit pollution is always at the loss of those who have the right to breath clean air[163]. The question of whose rights are of paramount importance follows. In a growing capitalistic economy, profit seekers have an incentive to externalize costs and internalize benefits. This results in many negative externalities that can be harmful to the public. Basic morality would reveal that the public must be protected from such irresponsible behavior proliferating. Furthermore, fundamental utility principles of economics dictate that the greatest utility should be sought. Therefore, the rights of the majority present and future public, who derive a great amount of utility from their health and well-being, deserve protection over the rights of private polluting entities who receive a smaller overall amount of utility resulting from profits. One question remains, what is the right amount of protection? If too much protection is sought, the public could be hurt through lob loss, price increases, income reduction, unavailable products, etc. However, if not enough is realized, the public could be hurt by negative impacts on their health and the environment. In this sense, the total impact of environmental regulations should be accounted for when determining how much regulation should be sought.

Environmental rights would surely advocate more environmental protection over less. The danger of this is that social costs could outweigh the social benefits of such a right. Too much environmental protection could harm the economy, which could affect not only Wall Street, but also every Household in the United States. A phase-in of such a right could help the economy slowly absorb the costs of the right overtime. This would allow Households, businesses, and the government to budget and plan accordingly, thus

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[160] IBID, Jaffe et al, p.153

[161] Hazilla M, Kopp RJ, "Social Costs of Environmental Quality Regulations: A General Equillibrium Analysis", Journal of Political Economy, Vol. 98, No. 41, 1990, p.866

[162] Coase RH, "The Problem of Social Cost", Journal of Law and Economics, Vol. 3, Oct 1960, p. 1-44

[163] IBID, Coase

limiting social costs. The justification for enacting such a right and incurring incremental social costs would be to prevent future cost increases that will not be able to be recouped. Future cost increases could result from unpredictable weather patterns affecting crops, infrastructure, and lives, as well as negative health outcomes requiring expensive medical treatment. Additionally, fossil fuel supplies are expected to dwindle in the near future. Legally mandating increased energy efficiency will not only help the environment, it will help firms cope with higher energy prices.

Is There Enough Public Demand for An Environmental Right?

An environmental right can only be adopted with public support. There are no studies that measure the demand for an environmental right in the United States, however there are many studies that measure public attitudes towards environmental protection. Examining these studies will help determine whether the American public believes that current levels of environmental protection are adequate, or if additional measures are desired. Polls and scholarly articles that attempt to measure and forecast the public's demand for environmental protection will also be examined.

The World Values Survey (WVS) conducts demographic studies to assess societal values all over the world. I will examine the WVS 1999/2000 wave of data for North American societal values towards the environment[164]. These data were collected through the University of Michigan using telephone and in in-person interviews based on established questionnaires. The study was designed to be measure attitudes of the adult population, 18 years and older. The total number of people interviewed for this study was 1200. Participants were asked to respond with a degree of certainty regarding the statements posed. The degree of certainty ranged from strongly disagrees, disagrees, agrees, or strongly agrees. A 2% margin of error is assumed.

The first question asked was, "I would give part of my income if I were certain that the money would be used to prevent environmental pollution". Responses revealed that 16% strongly agreed, 52% agreed, 24% disagreed, and 6% strongly disagreed. In a liberal interpretation this would amount to a 68% positive response and a 30% negative response. The next question stated, "I would agree to an increase in taxes if the extra money were used to prevent environmental pollution". Responses indicated that 12% strongly agreed, 47% agreed, 29% disagreed, and 9% strongly disagreed, which is about 59% positive and 38% negative. When asked, "The government should reduce environmental pollution, but it should not cost me any money", responses indicated that 24% strongly agreed, 32% agreed, 36% disagreed, and 5% strongly disagreed. This is approximately 56% positive and 41% negative response.

The next question concerned the relationship between environmental protection and economic growth. Respondents were asked to choose the statement that comes closest to their own point of view. Options were; 1) protecting the environment should be given priority, even if it causes slower economic growth and some loss of jobs; 2) economic growth and creating jobs should be given top priority, even if the environment suffers to some extent; 3) other answer (to be volunteered by the respondent); 4) don't

[164] World Values Survey Website – 9062000 Values Survey B001-B009 located at http://www.worldvaluessurvey.com/services/index.html accessed on March 21, 2006

know; 5) no answer; 6) not applicable; or 7) not asked in survey. 58% of respondents chose option #1 to protect the environment, 32% chose option #2 to promote economic growth, 5% chose #3 and offered other answers, and 3% picked #4 because they didn't know. This suggests that the majority values environmental protection over economic growth.

The last question asked regarded the relationship between humans and nature. Respondents were asked to choose the statement that came closest to their own views. Options included; 1) human beings should master nature; 2) humans should coexist with nature, 3) both, 4) neither; 5) other answer, 6) don't know; 7) no answer; 8) not applicable; or 9) not asked in survey. Results indicated that 14% choose that humans should master nature option #1, 84% choose that they should coexist #2, and 1% chose the didn't know option. This indicates that the majority of people believe that humans must coexist with nature. It also suggests that society believes that humans should not have a dominant relationship over nature.

The results of the WVS on societal views towards the environment overwhelmingly indicate that North Americans value environmental protection. Evidence suggests that people are willing to sacrifice incremental personal wages, limited job loss, and some economic growth for increases in environmental protection. This makes a positive case for public support for an environmental right. However, this survey may not be an accurate representation of true public values. Surveys have various inherent biases that could inadvertently lead respondents to choose desired answers. Also, surveys may accurately measure theoretical attitudes, but may poorly represent actual practices. This means that people may be more willing to make economic sacrifices on paper, but less willing to incur these cost in real life. Although there are limitations of surveys, they still represent a valuable tool in measuring attitudes and predicting public opinion. The results of the WVS preliminarily suggest that there could be public demand for more environmental protection in the United States.

A 1991 study of poll trends regarding environmental problems and protection published by The Public Opinion Quarterly concluded that trends indicate that public concern for environmental quality has reached an all-time high[165]. This study examined trends by environmental problem topic area including relative importance, perceived seriousness, degree of threat, support for government actions, business and the environment, environment and the economy, willingness to pay, and pro-environmental behaviors. Sources of data that were examined in this study include information collected by the following organizations: Cambridge Reports/Research International, The Gallup Organization, Gallup/Newsweek, Louis Harris and Associates, Media General/Associated Press, National Broadcasting Company (NBC)/Wall Street Journal, NORC's General Social Survey, The New York Times/Columbia Broadcasting System (CBS), the Roper Organization, and Yankelovich, Clancy and Schulman.

Regarding the relative importance of environmental problems, it is noted by the authors that environmental problems are sometimes not seen as being particularly important to the public. The issue of 'salience', which has to do with an issue coming to the forefront of public attention, is related to environmental problems. The authors claim that environmental problems have become increasingly salient since the mid-1960's, but

[165] Dunlap R, Scarce R, "Poll Trends: Environmental Problems and Protection", The Public Opinion Quarterly, Vol. 55, No.4, Winter 1991, p.657

still fall short from being at the top of the list of public concerns[166]. The authors note that judging the strength of the public's concern about environmental issues is difficult. They suggest measuring the importance of environmental problems in relation to other issues as a way of determining this. An example of comparative measurements could be a study by the Alliance for Marriage, which conducted a survey about how American feel about the health of marriage in this country. The study indicated that 77% of those polled valued strengthening the families as a greater national priority over a cleaner environment[167]. Considering the source of the poll, the results maybe highly suspect of inherent biases. However, ranking the importance of environmental concerns to other problems of national priority is important to help guide policy makers. Dunlap and Scarce also note that the strength of environmental issues on electoral voting is rare.

The perceived seriousness of environmental problems has experienced an unmistakable upward trend. Majorities see environmental quality as deteriorating and likely to continue doing so in water and air pollution, global problems like climate change, local solid waste issues, and use of plastics[168]. The threat posed by environmental problems is evident as a wide range of environmental problems are perceived by the public majority as being somewhat threatening to their personal health and safety as well as the quality of the environment. From 1987 to 1989 there was a 10%-15% increase in the public's perception of the increased threat that various environmental problems pose[169].

Support for government action has also increased, according to the authors of this study. The public majority maintains that the government is spending too little on environmental problems, that regulations have not gone far enough, and that there are too little government regulations regarding environmental protection[170]. There is even strong support for environmental restrictions that limit individual behavior. The authors claim that the strong support for increased government action is because the public believes it is the responsibility of the government to protect the environment and that they are skeptical of individual efforts to this end in the absence of government regulation. With respect to the relationship between business and the environment, the public believes that business and industry will not voluntarily protect the environment. Government action is further supported because the public perceives industry to be a major contributor to environmental problems and the private sector is believed to do a poor job of protecting the environment[171]. Dunlap and Scarce maintain that the trend for environmental protection over economic growth has increased with the majority wanting more environmental protection and only a small minority endorsing economic growth. The authors cite the support for environment protection 'regardless of cost' and a growing proportion of people willing to accept higher unemployment as a tradeoff for increased environmental protection as evidence of this trend[172]. The authors also cite that many

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[166] IBID, Dunlap & Scarce, p. 653
[167] Moorer TD, "Proposed Constitutional amendment seeks to define marriage", The New York Amsterdam News, May 30-June 5, 2002, p.31
[168] OpCit, Dunlap & Scarce, p.654
[169] IBID, Dunlap & Scarce, p.654
[170] IBID, Dunlap & Scarce, p.655
[171] IBID, Dunlap & Scarce, p.655
[172] IBID, Dunlap & Scarce, p.656

respondents believe that American society can have economic growth and a clean environment at the same time and that these two things are not mutually exclusive[173].

Trends indicate that the public has an increased willingness to pay for environmental protection. Various polling data reveal that the majority position accepts incurring some higher costs that could arise from increased environmental protection[174]. This data illustrates willingness to pay in theoretical terms, but may not translate into actual willingness to absorb the costs of increased environmental protection. Lastly, the authors detail how the majority of people describe themselves as environmentalists and more people are affiliating themselves with environmental organizations. Significantly smaller amounts of people claim to have taken political action or state willingness to work for environmental protection, but the numbers still exhibit an upward trend. Green consumerism is also seems to be on the rise as more people claim to avoid buying products from environmentally irresponsible companies, people claim to be using fewer environmentally harmful products (aerosols, phosphate soaps) and many claim to have changed personal behaviors to be more 'ecologically responsible'[175]. With respect to this trend the authors note that respondents typically favor those actions that require minimal effort and personal cost. They maintain that these findings likely overstate the value that the American public has for environmental protection because the answers are self-reported and there is no way to insure that people respond truthfully or in accordance to their actual behaviors.

The findings from the Dunlap and Scarce study indicate that the American public, in 1991, seems to be valuing environmental protection more than ever before. There are trends indicating increasingly positive support for environmental protection in America. These trends may be overstated due to biases and practical issues related to polling. However, these trends are so significant that the overstatements are not likely to cause major deviations in the outcome of increased majority support for environmental protection. A 2006 poll conducted by Time magazine/ABC News and Stanford University, regarding global warming and environmental protection indicate that three-quarters of Americans believe that the government (president, Congress), businesses, and the public should take more action to help the environment[176]. Additionally, the poll reveals that 52% support government mandates to curb global warming, 61% support government mandates to reduce power plant emissions, and 87% support tax breaks to develop solar, wind and water power[177]. However, 81% oppose higher taxes on electricity and 68% oppose higher gasoline taxes[178].

It is well documented that demand for environmental protection is directly correlated with the wealth and standard of living of a society. As people become wealthier and their basic needs are met, quality of living issues such as the health of the environment, become of greater concern. Factors that can affect demand for environmental regulation can include a person's age, education, income, race, location of

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[173] IBID, Dunlap & Scarce, p.656
[174] IBID, Dunlap & Scarce, p.656
[175] IBID, Dunlap & Scarce, p.657
[176] Time Magazine Website – "Poll: Americans See a Climate Problem", March 26, 2006, located at www.time.com/time/nation/printout/0,8816,117696700.html accessed on March 29, 2006
[177] IBID, Time Website
[178] IBID, Time Website

residence, and industry of employment[179]. Kahn asserts that people in their youth value more environmental protection, but they may be unable to pay more for it. Middle-aged people may desire less environmental protection because they have many financial pressures and they are skeptical of the government's ability to address environmental problems. The elderly may support more environmental protection as a way to leave a legacy to younger generations, have more leisure time to value the environment, and because they are more susceptible to environmental pollution[180]. America is rapidly aging as the baby-boomer population nears retirement. This could positively affect the demand for environmental protection in the future. Education plays a role in demand for environmental protection, as educated people are more aware of the dangers of pollution. Increasing or decreasing future educational outcomes in America could impact the demand for environmental protection. Kahn asserts that race could play a role in environmental protection as low-income minority populations may have less of a demand for environmental protection. However, many low-income minorities maybe victims of environmental injustices (See the Environmental Justice chapter of this book) and may therefore be more willing to support increased environmental protection[181]. The changing racial demography of America could impact future demands for environmental protection. Kahn notes that America's Hispanic and Asian populations are growing as the white percentage is falling. Location of residency is also a determining factor of support for environmental protection as Kahn notes that suburban living increases the demand for market goods that create pollution. He also notes that of the 75% of Americans who live in metropolitan areas, increasing numbers are residing in the suburbs rather than the center cities. He also notes that country living may increase appreciation for the environment[182]. Lastly, Kahn asserts that workers in polluting industrial sectors may be less likely to support environmental protection because such regulations would negatively impact their employment[183]. However, as many industrial and mining activities are increasingly being relocated to foreign countries, there may be less opposition to environmental protection domestically.

In light of evidence from Kahn's study, the future of environmental protection could look very positive. An aging population that is educated, has income stability, with support from all races, and less industry could increase the demand for environmental protection. This could translate into increased support for a Constitutional environmental right. The future is unknown and many factors could work against such efforts. Increased suburban living, poor educational outcomes, subordination of the problem by certain racial groups, and industry power could negatively affect demand for further environmental protection.

Overall, America seems to be more concerned about the environment than ever before. However, this increased concern may not be accompanied by real-world actions to limit consumption or curtail environmentally irresponsible habits. People seem to be unconvinced about individual contributions to preserve the environment and maintain

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[179] Social Science Resource Network Website - Kahn ME, "Demographic Change and the Demand for Environmental Regulation", located at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=205008 accessed on March 21, 2006
[180] IBID, SSRN Website, p.4
[181] IBID, SSRN Website, p.5
[182] IBID, SSRN Website, p.6
[183] IBID, SSRN Website, p.6

that businesses are often responsible for environmental degradation. They also seem to think that the government should play a larger role in environmental protection, yet are less willing to absorb the costs associated with increased government participation. This may illustrate public misconception about how the government works or may reveal the public's unrealistic expectation on the government.

Federalism and Environmental Rights

A discussion about governmental aspects of a Constitutional environmental right would not be complete without examining the relationship between federal and state governments. There are three basic types of government in the world today, federalism, unitary systems, and confederacies. The idea behind federalism is that there is a national framework of laws that hold significant power, with subordinate state laws and governments that also hold significant power. The U.S., Canada, Australia, Russia, and Brazil are all governed by a federal system. The unitary system is currently the most prevalent in the world. Unitary systems hold power in a central national government, with very little power being given to political subunits likes towns, provinces, etc. Examples of countries run by unitary systems include China, Britain, and France. Confederate systems advocate the union of equal states with some limited power at the national level. However, this system is not popular because conflicting interests of individual states often breakdown the union. There are no existing examples of confederate systems although the United States began as a confederacy, Switzerland and Germany were also confederacies during portions of the 1800's. Within federalism there are two schools of thought, dual federalism and cooperative federalism. Dual federalism maintains that the federal and state governments are co-equals and maintain their own sovereignty. Under this school of thought state powers are expanded and federal powers are limited to strict interpretations of the powers granted by the Constitution. Cooperative federalism advocates greater power to the federal government and subordinate power to the states. Currently, the United States exhibits cooperative federalism, which began to replace dual federalism around the mid 1800's.

The question regarding federalism and environmental protection is whether the federal government should be in charge or if state governments should hold more power. Currently, the federal government sets environmental standards and state governments are allowed to enact stricter standards, but cannot have standards below the national maximums.

Advocates of national control over environmental protection believe that it is necessary to prevent states from lowering environmental standards to increase competitiveness and attract business, coined the 'race to the bottom'. Federal environmental protection has also been sought because of the transboundary nature of pollution. This rationale suggests that a downwind state could be negatively affected by the upwind state's pollution or that pollution from one area can affect many other areas. Therefore, a national limit should be in place to offer a baseline amount of protection to all states, regardless of geography. Another argument for federal power is that many state pollution control agencies are short staffed and unable to handle the burden of statewide environmental protection. Correspondingly, national advocates believe that state governments do not have the knowledge to handle many pollution issues. Many argue that power must be given to the federal government to avoid pressure from local

industries that would otherwise overrun state governments. It is also argued that the federal government would be better suited to protect the environment because it can achieve economies of scale, thus creating a cost advantage. Lastly, some believe that the federal government should have more control over environmental protection because citizens have the right to a clean environment.

Supporters of an increased state role in environmental protection believe that state governments are closer to the people and are more able to identify and address their needs and desires. State governments are also more familiar with the specific environmental concerns affecting their jurisdiction, and may thus be able to address those concerns more efficiently without the distortion of national intervention. Schoenbrod asserts that the federal lawmakers make relevant and irrelevant environmental regulations, but are not held accountable by the local citizens for results because the politicians are too far removed from the citizens[184]. State supporters also point to the role of state experiments in coming up with innovative and efficient methods of handling environmental problems. Too many federal regulations could prevent these experiments from taking place and could result in the stagnation of creative solutions. Some also suggest that the federal chain of command may be too lengthy and burdensome to implement. Overly broad federal regulations maybe so cumbersome and full of exclusions and variances that state governments may not be able to interpret or administrate them properly[185]. Advocates of increased state power also assert that the 'race to the bottom' does not exist because of NIMBY (not in my back yard) pressure from citizens. They claim that there is actually a 'race to the top' fueled by citizens that offsets pressure from industries to relax rules. State supporters also suggest that the federal government is susceptible to intense industrial and partisan pressure, which could undermine environmental outcomes.

Georgetown PhD researcher, Sonja Walti studied how aspects of federalism affect environmental policy[186]. Walti compared federal and unitary countries to determine whether federal power or autonomous state power was more effective at protecting the environment. She found that fiscal decentralization plays more of a role in environmental performance than levels of state and federal power. She notes that policy perspectives of federal and unitary countries are not fundamentally different, though there is a major difference in the distribution of resources across levels of government. Walti also found that unitary efforts did better at protecting air quality, but worse at protecting water quality. Federal efforts did worse at protecting the air, but comparatively better at protecting water. Walti also found that unitary efforts are more successful in allocating resources addressing environmental concerns in areas that have high per capita income levels. How could these findings impact the United States? If states had more power, wealthy states like Connecticut and Colorado may be able have more environmental regulations and address environmental concerns more effectively than poor states like West Virginia and Arkansas. Federal governments are able to more evenly distribute

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[184] CATO Institute Website – "Why States, Not EPA, Should Set Pollution Standards", Schoenbrod D, located at http://www.cato.org/pubs/regulation/reg19n4a.html accessed on March 28, 2006

[185] IBID, CATO Website

[186] Weidenbaum Center on the Economy, Government and Public Policy Website – "The Impact of Federalism and Other Patterns of Institutional Fragmentation on Environmental Policy", Sonja Walti, located at http://wc.wustl.edu/workingpapers/Walti.PDF accessed on March 28, 2006

resources so that environmental disparities between states are not as prevalent as the situation illustrated above, however, that ability may not always be realized in practice.

Oates succinctly outlines the different environmental roles that state and federal governments are best suited to handle[187]. He maintains that the federal government should have responsibility for supporting research and providing information on environmental matters. This will help the states determine priorities, address concerns properly, reduce guess work, coordinate efforts, develop the best technologies, etc. Oates recognizes the importance of state experimentation in innovative methods of environmental protection. He believes that national leadership in scientific research, knowledge, and technology along with state experimentation would be an optimal policy mix[188]. Oates advocates the role of a central government in standardizing pollution control for increased cost savings. He illustrates this point through the great burden that would arise for manufacturers if they had to produce 50 different car variations depending on individual state emission requirements. Oates praises the role of state governments in addressing local pollution problems, such as local waste management or local drinking water quality, as being superior to a uniform national solution. In this sense uniform national standards could be too strict or too lenient when applied to a local pollution problem. This could result in welfare losses and inefficient solutions, respectively. Oates identifies regional management of environmental issues, such as watershed management, that combine regional cooperation and jurisdiction as an alternative to purely local or national solutions[189].

In light of Oates's argument the current structure of environmental protection, where national maximum pollution levels are set and states are allowed to set stricter maximums, may be appropriate. While this may curtail some state experimental innovation, the national role may be paramount in light of many global environmental problems such as global warming and ozone layer destruction. These global issues require international efforts to address. In the absence of a nationally coordinated environmental protection effort, coordinating and participating in an international effort (such as the Kyoto Protocol) would be impossible.

There is also the belief that globalization has put more pressure on all levels and aspects of government. Federal, state and local governments have lost incremental units of power as transnational corporations proliferate and NGOs and non-profits gain increased citizen support and organizational competency[190]. This has increased the role of the national government as the central orchestrator, while giving state governments more power and control over implementation, often through outsourcing to private contractors. This phenomenon has resulted in problems of; 1) inability to adapt traditional systems to new problems; 2) limited capacity and accountability; 3) lack of education; 4) issues of scale[191]. The inability to adapt is a result of large government service networks that are slow to act and even slower to change. There is a limited capacity of these large devolved networks to track accountability and be managed

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[187] Oates WE, "A Reconsideration of Environmental Federalism", Resources for the Future, Discussion Paper 01-54, November 2001
[188] IBID, Oates, p.22
[189] IBID, Oates, p.25
[190] Kettle DF, "The transformation of Governance: Globalization, Devolution, and the Role of Government", Public Administration Review, Vol. 60, No. 6, Nov/Dec 2000, p.488
[191] IBID, Kettl, p. 495

effectively. These networks are the result of population and globalization pressures to increase in size, but the increase in size may have resulted in a decreased ability to track spending and measure accountability. Kettl maintains that many public policy schools have not identified the specific trends and problems that the government currently faces. As a result, policy makers are not aware or able to deal with the shift in government practices that are occurring. Lastly, Kettl mentions that the scale of government dictates that some problems are better handled at the state level, such as welfare reform, whereas other issues are better suited for federal action, such as security and international trade. This point echoes Oates's assertions that local governments better address some pollution problems while federal efforts can more appropriately handle other environmental problems. Kettl asserts that the federal government's inability to coordinate between partisan groups, Congress, and the executive branch may limit national power relevance. Correspondingly, Karkkainen asserts that,

> "conventional approaches to environmental regulation are nearing a dead end, limited by the capacity of regulators to acquire the information necessary to set regulatory standards and keep pace with rapid changes in knowledge, technology, and environmental conditions. A pervasive information bottleneck constrains the extent, effectiveness, efficiency and responsiveness of the regulatory system."[192]

Karkkainen's point confirms Kettl's argument in that current forms of government environmental regulation are not effective since they cannot respond to the dynamic and exponential nature of environmental pressures and resulting problems.

Kettl's points about the difficulties coordinating different branches of government and the lack of accountability of the federal government are two negative points against the current system of nationally centered environmental protection. Although, this does not mean that the states should be given the dominant role in environmental protection, it does mean the current system may need restructuring. A Constitutional Amendment for an environmental right maybe the exact type of restructuring that is needed to address the issues of coordination and accountability. A Constitutional environmental right would set up positive and negative duties for the federal government as well as legal ramifications if those duties were not fulfilled. The increased legal liability would be an incentive for the government to act appropriately in environmental matters, for fear of expensive legal repercussions. The federal government may be more likely to track accountability for environmental issues to assign blame for costly fines and legal actions associated with environmental proceedings. Surely, any administration would want to know which person in the chain of command was responsible for any improper actions that cost the government money and negative press. Matters concerning the Constitutional also take higher priority in Washington. This increased priority could facilitate coordination between the branches of government. The wording of the Constitutional Amendment could also guide law and policy makers when posed with tough issues, yielding clearer options and choices while reducing debate and partisan politics. A Constitutional right does not mean that states would be given less power in environmental protection. States would still be allowed to have stricter standards than the federal government. Furthermore, a Constitutional commitment to environmental protection could cause more states to adopt state environmental rights. Innovation could also be encouraged because environmental issues would be elevated to a higher level of

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[192] Karkkainen BC, "Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?", Georgetown Law Journal, Vol. 89, 2000-2001, p.263

national importance and public scrutiny. Increased federal commitments and accountability could also translate into more funding for state environmental protection, though costs increases would also be certain.

An environmental right could serve to shift the domestic economy towards environmentally friendly products and processes. This is because Federal, State and Local government spending accounts for about 20% of the GDP. If even a portion of this was directed towards environmentally sustainable products, through the imposition of an environmental right, it would lower the prices of these products for everyone while also giving incentives to businesses, industries and entrepreneurs to enter the environmentally friendly market. A Constitutional Amendment will not perfectly address the issues of accountability or coordination. Moreover, a Constitutional right may solve existing problems, but create new ones. However, it will absolutely increase the rights of every U.S. citizen, bolster state environmental protection, improve federal environmental protection, and enhance our nations ability to participate in addressing global environmental problems.

CONCLUSION

The current form of the U.S. Constitution has inherent barriers to environmental protection that exclude future generation, prevent due process of the law, and impede environmental policy through government fragmentation. Amending the Constitution with an environmental right would address these shortcomings and grant superior environmental health and protection for current and future Americans. It is also clear that the United States Environmental Protection Agency is not powerful enough to do its job effectively. An environmental right could do much to rehabilitate the agency by giving it a right to protect and by reforming much of its internal and external structure. The EPA is also in desperate need of some independence and insulation from the executive, legislative, and judicial branches. It is evident from many examples that political pressure has the ability to undermine environmental protection. An environmental right could help protect the agency from short-term political pressure in favor of long-term environmental protection.

The cost of regulation is the most burdensome aspect of environmental regulation. Historically, the environmental and the goods and services it provides have been taken for granted by humans. Placing increased protection mechanisms on the environment and valuating goods and services that were previously not quantified before could put a short-term strain on domestic and world economies. Phasing in this right over a five or ten year period is a good way to help markets adjust and minimize social costs associated with increased environmental regulation. Focusing on the long-term objectives of better health outcomes, stabilizing global climate, avoiding future costs related to environmental degradation and instability, achieving a guaranteed level of environmental quality, and leading developing nations towards an environmentally responsible evolution will help justify short-term costs and economic transitions. Implementing this right will require the government to weight benefits of increased protection with decreased benefits in other areas of spending. Principles of proportionality can help identify the best way to minimize costs and use government resources the most efficiently. Short-term sacrifices

will have to be made by all sectors of the economy to develop, implement, and enforce an environmental right.

The public seems to be more aware of environmental issues and demand is increasing for more environmental protection. Although awareness and demand are increasing, the public seems to be uneducated about the cost realities of augmented environmental protection. They seem to understand that the government must limit business practices, because these practices often harm the environment. They also seem to understand that without decisive government action, individual actions to protect the environment are barely incremental. It is possible that the costs associated with an environmental right would decrease the demand for more environmental protection, in favor of short-term economic benefits. Since it is human nature to prefer current consumption over consumption in the future, it may be hard to appeal to the public to incur costs now to enjoy benefits sometime in the future. It may even be harder to convince people that these costs should be borne now, when the majority of the benefits may not be enjoyed in the same lifetime that the costs where incurred. The majority of the benefits will be received by future generations in the form of climate stability and preserved environmental quality, but present generations do stand to enjoy considerable benefits as well.

There are valid arguments for state and federal control over environmental protection. It is also evident that some environmental protection functions are more suited for state implementation where as other are better suited for federal administration. An environmental right would grant more power to the federal government, but would give the states considerable power in setting stricter standards, implementing and enforcing environmental laws. The superior role afforded to the federal government is important to enable increased scientific inquiry and to coordinate in international efforts to address global environmental issues.

An Amendment to the U.S. Constitution would have considerable symbolic value. Even if it was loosely constructed and not self-executing it could have a strong effect on government, business and consumer behavior. It could tip the balance in executive and judicial decision-making and change the way Congressional officials approach environmental matters. An environmental right will not prevent or address every environmental issue, but it would elevate environmental protection to a higher level of national priority. It would also spur the United States to become more environmentally sustainable and efficient, which will be advantageous in the future marketplace with higher energy costs and increased demand and competition for resources. All humans should perceive an environmental right as a economic and biological necessity. We need it to protect ourselves from short-term profit-seeking behavior that benefits a minority and harms the majority. We need it in order to obtain a competitive advantage for the future. Most of all, we need it to preserve the habitat of our species, to the best of our ability, to insure our long-term survival.

An American Evolution – Environmental Justice Chapter

Christina Simeone

INTRODUCTION

Environmental justice is a movement that relates the social problems of discrimination, based on race or economic class, with environmental protection. The original definition of Environmental Justice is:

> "The fair treatment and meaningful involvement of all people regardless of race, color, national origin or income with respect to the development, implementation, and enforcement of environmental laws, regulations and policies", continuing that, "fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local and tribal programs and policies."

The environmental justice movement grew in response to numerous findings that low-income and minority populations bear a higher environmental risk burden than others in the United States. They are also less able to participate in the decision-making process and have less access to information about the hazards and operations associated with pollution in their neighborhoods.

In response to growing concerns about environmental justice, President Clinton enacted Executive Order 12898 to assure that the federal government would address environmental justice concerns. However, under subsequent administrations the commitment to environmental justice was extended to all people, which de-emphasized the extra protection granted to vulnerable low-income and minority populations. As a result of this definition change, the new federal understanding of environmental justice is as follows:

> "Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EPA has this goal for all communities and persons across this Nation. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work"[1]

Some assert that this definition is the best and fairest way to achieve an equal distribution of environmental quality in the United States. Others argue that this new definition goes against the original aim of the environmental justice movement, as per Executive Order 12898, which is to protect low-income and minority populations who bear a disparate amount of environmentally related risk. These populations are exposed to more risk

[1] EPA Website – Environmental Justice Home, located at http://www.epa.gov/compliance/environmentaljustice/index.html accessed on May 2, 2006

because of free market economic forces and intentional or inadvertent discriminatory practices.

This chapter will detail a brief history of the environmental justice movement and explain the current status of environmental justice in the United States. It will then examine a few real world case studies to illustrate some environmental justice scenarios. Exploring the opinions of those who criticize the environmental justice movement in the United States will follow this. International instances of environmental justice will then be examined. A discussion of how environmental rights could serve to enhance the environmental justice movement by bolstering legal forms of redress then follows. The chapter will end with a conclusion based on the findings of the materials discussed.

HISTORY OF ENVIRONMENTAL JUSTICE

The history of environmental justice began in 1964 when the U.S. Congress passed the Civil Rights Act. Title VI of the Civil Rights Act prohibited the use of federal funds to discriminate based on race, color, and national origin. After Title VI, a series of events framed the development of the environmental justice movement. In 1970, the United States Public Health Services (USPHS) admitted that lead poisoning was disproportionately affecting African American and Hispanic children. In 1971, the President's Council on Environmental Quality (CEQ) released an annual report stating that racial discrimination negatively affects the urban poor and the quality of their environment.

In 1979, the Northeast Community Action Group of Houston, TX filed the first civil rights lawsuit on the grounds of environmental discrimination. In *Bean v. Southwestern Waste Management, Inc*, attorneys questioned the location of a waste facility in the Northwood Manor neighborhood, in which 82% of the population was African American[2]. According to Bullard, data collected for *Bean v. Southwestern Waste Management, Inc* found that,

> "…the siting of local waste facilities was not random, Moreover, this was not a chicken-or-egg (which came first) problem. In all cases, the residential character of the neighborhoods had been established long before the industrial facilities invaded the areas"[3]

Browning-Ferris Industries had attempted to locate a waste facility in the Northwood Manor community in 1970, when the area was predominately white. The Harris County Board of Supervisors defeated Browning-Ferris's attempts at that time. In 1979, after the demography of the community had changed to be predominately black, Browning-Ferris successfully obtained a permit[4]. Data collected for the case found that although the population of Houston was only 30% African American, all the city landfills, six of eight municipal solid waste incinerators and three of the four private landfills were located in

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[2] Bullard RD, *Dumping In Dixie: Race, Class and Environmental Quality*, 3rd Edition, Westview Press, 2000, Boulder, CO, p.xiv

[3] IBID, Bullard, p. xiv

[4] University of Dayton School of Law Website – Legal Strategies to Challenge Environmental Racism, JH Hurwitz & EQ Sullivan, located at Using Civil Rights Laws to Challenge Environmental Racism accessed on April 7, 2006

predominately African American neighborhoods[5]. The legal outcome of *Bean v. Southwestern Waste Management, Inc* held that the plaintiff must show more than a disparate impact to win an equal protection environmental justice claim.

Although the Houston case was the first to address environmental justice, the environmental justice movement came into force in Warren County, NC. In 1982, Warren County, NC residents protested a proposed polychlorinated biphenyl (PCB) landfill being located in their neighborhood. The Warren County, NC community was predominantly African American and low income. They argued that poor and minority communities are underrepresented in the political sector, and therefore are the easiest places to locate undesirable facilities, such as a toxic landfill. Warren County had tried in court to challenge the State's decision to locate the landfill in their area, but their efforts failed. The EPA eventually granted permits under the Toxic Substance Control Act for the landfill, which outraged the local community and attracted national attention. The landfill was built to contain about 60,000 tons of PCB contaminated soil. The landfill was built with PVC and clay caps and liners and also had a dual leachate collection system[6]. Many people were arrested as civil disobedience and protesting proliferated in conjunction with the construction of the landfill. In response to the public uprising, Governor Jim Hunt wrote an open letter to the community stating that Warren County was selected for technical reasons. He also stated that the site would be detoxified once the technology was available. The General Assembly also mandated the state's commitment to detoxify the landfill, once appropriate technology became available.

The citizens of Warren County were not able to prevent the construction of the landfill, but their struggles jumpstarted the environmental justice movement. The people involved in the movement coined the term 'environmental racism' to describe their plight. The term environmental racism gained national attention and gave a name to an experience that many other communities were suffering with. The Warren County experience also sparked many studies that examined the environmental inequities existing in the United States. These studies quantified and documented evidence of the relationship between socio-political standing and environmental decision-making[7].

After Warren County, several other events took place to fuel the environmental justice movement. In 1983, the U.S. General Accounting Office (GAO) issued a report stating that three out of every four commercial hazardous waste landfills in the Southeast U.S. were located in communities of color[8]. In 1987, the United Church of Christ Commission on Racial Justice confirmed the GAO's findings, and asserted that this pattern existed on a nationwide level[9]. This study also found that three out of five

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[5] IBID, University of Dayton School of Law Website

[6] North Carolina Department of Environment and Natural Resources – Warren County PCB Landfill Fact Sheet, located at http://www.wastenotnc.org/WarrenCo_Fact_Sheet.htm accessed on April 8, 2006

[7] Sierra Club Website – "Environmental Justice: The Beginnings of a Movement", Phaedra Pezzullo, Jan 2000, located at http://www.sierraclub.org/environmental_justice/stories/northcarolina.asp accessed on April 11, 2006

[8] U.S. General Accounting Office – "Sitting of Hazardous Waste Landfills and Their Correlation with Racial and Economic Status of Surrounding Communities", Letter of June 1, 1983, RCED-83-168, located at http://archive.gao.gov/d48t13/121648.pdf accessed on April 11, 2006

[9] Commission for Racial Justice, United Church of Christ. "Toxic Wastes and Race in the United States; A National Report on the Racial and Socio-economic Characteristics of Communities with Hazardous Waste Sites." New York, Public Data Access, Inc., New York, NY, 1987

African Americans and Hispanics in the U.S. live near unregulated toxic waste sites. Additionally, they found that race was more strongly related to residence near a hazardous waste site than socio-economic status. In 1990, University of Michigan researchers held a conference to share the data they collected regarding the relationship between race and hazardous waste sites around Detroit, Michigan. The study showed that minority residents were four times as likely to live within one mile of a commercial hazardous waste facility than white residents. They also concluded that race was a better indicator of proximity to these waste facilities than income level. The Michigan conference publicized environmental inequalities by encouraging participation by other researchers and involving Federal and State officials[10]. In 1991, the first National People of Color Environmental Leadership Summit was held in Washington, DC. Over 650 participants gathered to adopt the "Principles of Environmental Justice", which outlined the goals and demands of the environmental justice movement for the first time.

In 1992 the Environmental Protection Agency (EPA) established the Environmental Equity Workgroup and the Office of Environmental Justice in response to scholarly and public concern about environmental racism. In July of 1992, the workgroup issued these final conclusions;

- There are observed differences between racial groups in terms of disease and death rates. Though limited data to explain the environmental contribution, there is a larger percentage of black children with high blood lead levels compared to white children.
- Racial minority and low-income populations are exposed to more air pollutants, hazardous waste facilities, contaminated fish, and agricultural pesticides in the workplace.
- Data are not routinely collected on health risks posed by multiple industrial facilities, cumulative and synergistic effects, or multiple pathways of exposure. Risk assessments and risk management procedures need improvement to better account for equity concerns. There is a need for environmental and health data to be analyzed by race and income.
- Opportunities exist to improve communication with members of racial minorities and low-income groups.
- There is a need for environmental awareness training.
- Native American groups have unique problems. They lack many resources necessary to protect their members. [11]

The "Environmental Justice Act of 1992" (S.2806) was introduced into the 102nd Congress by Congressman John Lewis and Senator Al Gore. Some of the goals of the bill were to 1) require environmental health data be collected and analyzed per different demographic groups; 2) to identify areas subject to the highest loadings of toxic chemicals through all media; 3) to assess the health impacts in those areas; 4) to assure that the groups in the high exposure areas have the opportunity and resources to

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[10] Bryant B., Mohai P., "The Michigan Conference: A Turning Point.", EPA Journal, March/April 1992. p 9-10

[11] National Council for Science and the Environment Website - "Environmental Equity", Linda-Jo Schierow, August 14, 1992, located at http://www.cnie.org/NLE/CRSreports/general/gen-3.cfm accessed on April 11, 2006

participate in the technical process of determining the extent of negative health impacts; 5) to require the Federal government to curtail activities having the most significant impact on the high exposure areas; and 6) to ensure that adverse health impacts associated with environmental pollution in the U.S. are not distributed inequitably[12]. This bill was redrafted and reintroduced to Congress in 1993 by Congressman Lewis and Senator Max Baucus as the "Environmental Justice Act of 1993" (S.1161). The 1993 version also sought to establish a program that would ensure nondiscriminatory compliance with environmental, health, and safety laws and to ensure equal protection of the public health[13].

1993 also marked the establishment of the EPA's National Environmental Justice Advisory Council (NEJAC), which is in charge of creating environmental justice policies and programs as well as implementing environmental justice throughout the EPA. The NEJAC is made up of 26 rotating members from various sectors of the community (academia, citizen groups, businesses, NGOs, local governments, etc) and one Designated Federal Officer. The first EPA Title VI (Civil Rights Act) administrative complaints were also filed in 1993 against the Mississippi Department of Environmental Quality and the Louisiana Department of Environmental Quality.

February 11th, 1994 marked one of the most pivotal events in the environmental justice movement. President Bill Clinton issued Executive Order 12898, entitled "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations". This order declared that,

> "To the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review, each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States…"[14]

This Executive Order set up the Federal Interagency Working Group on Environmental Justice, developed timelines and goals for agency strategies, mandated reports to the President, outlined responsibilities of other federal agencies, set research and data collection directives, set up public participation and access to information requirements, and stipulated various other federal goals related to environmental justice. The wording of the Executive Order defined environmental justice as specifically related to lox income and minority populations. This was in response to the findings that low-income and minority populations are exposed to higher environmental risks than the rest of the population. The environmental justice movement came into full force with the issuance of President Clinton's Executive Order in 1994. Public awareness increased and many

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[12] The Library of Congress Website – "Environmental Justice Act of 1992 (Introduced in Senate)", 102nd Congress, 2nd Session, June 3rd, 1992, located at http://thomas.loc.gov/cgi-bin/query/z?c102:S.2806.IS: accessed on April 11, 2006

[13] The Library of Congress Website – "Environmental Justice Act of 1993 (Introduced in Senate)", 103rd Congress, 1st Session, June 24, 1993, located at http://thomas.loc.gov/cgi-bin/query/z?c103:S.1161.IS: accessed on April 12, 2006

[14] EPA Website – "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations", located at http://www.epa.gov/history/topics/justice/02.htm accessed on April 12, 2006

organizations and funding instruments were created to address environmental justice issues.

CURRENT STATE OF ENVIRONMENTAL JUSTICE

About ten years after President Clinton issued Executive Order 12898, indications arose that federal efforts to advance the environmental justice movement were largely ineffective. In 2004, a report was conducted by the EPA's Office of the Inspector General (OIG) in response to a request by a non-profit group, Public Employees for Environmental Responsibility. This group believed that market-trading plans for air pollutants would negatively impact low-income and minority populations. These trading schemes allow power plants and pollution emitters to buy and trade emission allowance credits. This system allows cleaner plants to sell extra credits to plants that have not upgraded their emission controls. Public Employees for Environmental Responsibility and others suggest that low-income and minority populations living near these older plants will be exposed disproportionately to pollution as a result of this system.

In March of 2004, the EPA's Office of the Inspector General released an evaluation report entitled, "EPA Needs to Consistently Implement the Intent of the Executive Order on Environmental Justice" (Report No. 2004-P-00007). This report claims that:

- The EPA had not fully implemented Executive Order 12898 nor consistently integrated environmental justice into its day-to-day operations.
- EPA has not identified minority and low-income, nor identified problem populations addressed in the Executive Order
- EPA has not developed or defined criteria for determining 'disproportionately impacted'
- Though Executive Order 12898 has been in place for 10 years, the EPA has not developed a clear vision, comprehensive strategic plan, or established goals, values, expectations or performance measurements.
- **In 2001, the EPA restated its commitment to environmental justice in a manner that does not emphasize minority and low-income populations. This goes against the intent of Executive Order 12898** [15]

The report goes on to state that the lack of clear definitions, criteria and standards has resulted in inconsistent implementation of environmental justice policies across EPA regions. The report also asserts that the EPA is bound to Executive Order 12898 and does not have the authority to reinterpret the order. The reports recommends that the Acting Deputy Administrator reaffirm that Executive Order 12898 applies specifically to low-income and minority populations that are disproportionately impacted, as well as standardize the definitions, goals and measurements related to environmental justice in order to enable consistent implementation[16].

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[15] EPA Website – Office of the Inspector General, "EPA Needs to Consistently Implement the Intent of the Executive Order on Environmental Justice**",** March 1, 2004, located at http://www.epa.gov/oig/reports/xmedia.htm accessed on April 12, 2006

[16] IBID, EPA Website

The restated definition of environmental justice that is referred to in the Inspector General's report is worded as such:

> "Environmental Justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. EPA has this goal for all communities and persons across this Nation. It will be achieved when everyone enjoys the same degree of protection from environmental and health hazards and equal access to the decision-making process to have a healthy environment in which to live, learn, and work."[17]

This new definition downplays the significance of low-income and minority populations in environmental justice by applying environmental justice broadly, to all people. This definition change took place in conjunction with an August 9th, 2001 memorandum regarding environmental justice, sent by then EPA Chief Administrator Christine Todd Whitman. This memo promoted the idea that environmental justice should be directed towards all people, including minority and low-income populations. The memo stated,

> "In sum, environmental justice is the goal to be achieved for all communities and persons across the Nation. Environmental justice is achieved when everyone, regardless of race, culture, or income, enjoys the same degree of protection from environmental and health hazards **and** equal access to the decision–making process to have a healthy environment in which to live, learn, and work."[18]

The wording of this memo defies the original intent of Executive Order 12898, which aimed to address environmental inequities in minority and low-income populations. The memo provides rationale for this restatement, in that existing environmental statutes provide many opportunities to address environmental risks and hazards in minority communities and/or low-income communities. The memo cites the National Environmental Policy Act (NEPA) of 1969 as clearly stating that the federal government is responsible to assure all Americans "safe, healthful, productive and aesthetically and culturally pleasing surroundings"[19]. The memo suggests that all people deserve protection from environmental hazards and that low-income and minority populations obviously deserve that protection because they are people.

Many organizations echo the EPA Inspector General's concerns and have objected to the environmental justice definition change. They believe that this restatement tactfully de-emphasizes the agency's commitment to concentrating on helping low-income and minority populations. According to World Watch, the new plan will "stall any further progress towards remedying the disproportionate pollution load

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[17] EPA Website – Environmental Justice Home Page located at http://www.epa.gov/compliance/environmentaljustice/ accessed on April 12, 2006

[18] EPA Website – Memo from Chief Administrator Christine Todd Whitman, "EPA's Commitment to Environmental Justice", August 9, 2001, located at http://www.epa.gov/enforcement/resources/policies/ej/admin_ej_commit_letter_081401.pdf accessed on April 12, 2006

[19] IBID, EPA Website – Memo from Christine Todd Whitman

suffered by minority populations"[20]. Environmentalists believe that focusing on environmental justice for all could make the entire idea meaningless. Furthermore, it could redirect resources from low-income and minority communities that are exposed to the proportionately higher risk from environmental pollution.

In 2005 nearly 80 members of Congress wrote a letter to the EPA criticizing the plan. They stated that by failing to "identify the key recipients of environmental justice actions", the plan is, " ultimately another attempt to de-prioritize the importance of focusing on our nation's most vulnerable populations"[21]. There has even been Congressional legislation introduced to codify the Clinton Executive Order into law, but it has not been successful. Representative Alcee Hastings has proposed H.R. 1648, which would require Executive Order 12898 to remain in force until changed by law as well as requiring Federal agencies to integrate Environmental Justice into their daily operations.

Barry Hill, Director of the Office of Environmental Justice at the EPA, defended the EPA's restatement saying that the Inspector General's recommendations would actually destroy attempts to implement environmental justice[22]. In a meeting of the National Environmental Justice Advisory Committee in New Orleans, Barry Hill stated, "The agency can't base what it's doing on an executive order…If someone said we had to, I'd have to say 'Are you on drugs?' "[23] Hill believes that the Executive Order gives minority communities the impression that Title VI of the Civil Rights Act of 1964 is the answer to environmental justice, which he believes is misleading[24]. He states that using existing environmental laws, rather than an executive order that can be changed at any time, will yield more success for environmental justice claims. Additionally, Hill believes that the original Executive Order's approach was backwards because it required categorizing a community with a definition of environmental justice before the EPA could address environmental justice issues in that community[25].

In the required response to the Office of the Inspector General's report EPA Acting Deputy Administrator, Stephen L. Johnson, criticizes the OIG recommendations,

> " Specifically, the Agency does not agree that its environmental justice program should be based upon the development and use of a uniform, national, quantitative measure for defining minority and/or low-income communities. The Agency has examined in detail the efficacy of such an approach. After a great deal of deliberation, the Agency concluded that, because issues of environmental justice are so diverse, variable, and complex, such an approach would not only be impractical but also could be detrimental to those communities. As a result, several years ago the Agency's senior management affirmatively opted for

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[20] Prugh T, "U.S. EPA Environmental Justice Plan Falls Short", World Watch, Vol. 18, Issue 6, Nov 1st 2005

[21] Richardson CT, "Environmental Justice Campaign Provide Fertile Ground for Joint Efforts with Reproductive Rights Advocates", Guttmacher Policy Review, Vol. 9, No. 1, Winter 2006

[22] Kamerick M, "EPA auditor criticizes effort to instill environmental justice", New Orleans City Business (LA), May 24th, 2004

[23] IBID, New Orleans City Business

[24] IBID, New Orleans City Business

[25] IBID, New Orleans City Business

multiple approaches, tools, and the flexibility to apply them, whenever appropriate."[26]

This point argues the validity of establishing set criteria and measurement mechanisms to qualify areas of environmental justice. Mr. Johnson believes that the environmental justice problem is so large and diverse that single methods of identification and linear approaches to solutions are a poor fit. However, the OIG report calls for clear definitions, standards and criteria to homogenize the way the EPA responds to environmental justice across the country. Mr. Johnson spoke about, "multiple approaches, tools and flexibility to apply them", these mechanism where no doubt examined by the OIG in their comprehensive study, which recommended a consistent approach. So the question remains is environmental justice better served through a consistent approach that would codify the way the EPA as a whole addresses environmental justice, or are multiple, flexible approaches more appropriate to address environmental justice concerns even if a degree of interagency inconsistency arises?

Stephen Johnson continued his response to the OIG report by stating that the OIG has failed to understand the true nature of Executive Order 12898.

> "Moreover, the agency also believes that the recommended OIG approach appears to be predicated on an intuitively reasonable, but faulty interpretation of Executive Order 12898. The OIG recommended approach is premised on the commonly held notion, drawn from the Environmental Justice Movement's emergence from the Civil Rights Movement, that environmental justice can be achieved merely by identifying disproportionately high minority and low-income communities, and designating them as forming a "protected class". This approach fails to recognize that the Nation's environmental laws do not recognize race, ethnicity, or income as protected classes. To the contrary, those environmental laws are designed to address human health and environmental effects for all communities. The OIG Evaluation Report fails to recognize that the Executive Order, in fact, did not direct federal agencies to identify and address disproportionately high minority and low income populations, but rather to address the disproportionately high and adverse human health and environmental effects on minority and/or low-income populations."[27]

This point seems to be arguing that by identifying low-income and minority communities before identifying pollution problems, a form of reverse discrimination results. Johnson seems to advocate identifying high-risk areas first and then focusing on protecting the communities exposed to that high risk, regardless of race, color or income.

This relates back to the 'chicken-or-the-egg' argument. It has already been extensively proven that low-income and minority populations are exposed to higher environmental risks than the rest of the population. Focusing on low-income and minority communities may make it easier to identify high-risk areas and implement existing environmental laws accordingly. In this sense demographic information about

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[26] EPA Website – Memorandum "Agency Response to Recommendations Provided in the OIG Evaluation Report entitles, "EPA Needs to Consistently Implement the Intent of the Executive Order on Environmental Justice", Stephen L. Johnson, June 7th 2004, located at http://www.epa.gov/compliance/resources/publications/ej/annual_project-reports/oig-report-ej-cover-memo-response-6-8-04.pdf accessed on April 14, 2006

[27] IBID – Stephen L. Johnson Memorandum

income and ethnicity may help the EPA identify and locate high-risk areas, thus enabling them to do there job more efficiently and effectively.

In June of 2005 the EPA released a draft "Framework for Integrating Environmental Justice" and the "Environmental Justice Strategic Plan Outline". The documents were released in response to the OIG report and recommendations. The plan aims to integrate environmental justice goals into EPA activities through the use of strategic targets that are specific, measurable commitments to achieving environmental justice. The plan creates five targets which include: 1) clean air and global climate change, 2) clean and safe water, 3) land preservation and restoration, 4) healthy communities and ecosystems, and 5) compliance and environmental stewardship. These five targets are accompanied by particular objectives and sub-objectives outlined for EPA regional offices to meet. Each EPA office and region will develop their own plans to achieve these objectives and sub-objectives. This new approach is based on an outcome and results standard, which commits the EPA to objectives and sub-objectives that can be quantifiably measured for success or failure. This approach gives each region specific goals to reach and assures that the agency will be able to measure the effectiveness of each solution through quantifiable data. An example of this method is taken directly from the draft plan. If an agency-wide clean air goal targets 3.4 million tons of nitrogen oxide reduction, then the environmental justice target objective would be to reduce 1 million tons of nitrogen oxide in communities with environmental justice concerns[28]. While parts of this system seems advantageous, as it identifies real objectives to be reached and measurable ways to determine if those objectives can be reached, it still has a large flaw. This system seems to not work well with the new definition of environmental justice. If environmental justice is extended to all people so that each person achieves the same level of protection as the rest, how is one certain that, for example, the 1 million ton reduction in nitrogen oxides occurs in a community suffering from adversely high environmental impacts. With the new definition of environmental justice, this targeted mandate can acceptably occur in areas that are marginally underserved, instead of the areas that are severely and disproportionately exposed to risk. Executive Order 12898 was setup to protect areas in which people are exposed to relatively higher environmental risk, especially low-income and minority populations that have limited political or financial power to battle their environmental oppressors. This draft strategic plan would be more effective if was combined with the original definition of environmental justice used by President Clinton. Interestingly, this draft plan ignores the recommendation of the OIG to reaffirm the EPA's commitment to low-income and minority populations as was intended by Executive Order 12898.

A report by Jenner & Block, an environmental law firm, identified some of the possible outcomes of the EPA's draft Environmental Justice Strategic Plan[29]. First, the report states that the definition change could indicate either an overall relaxation of enforcement of environmental justice concerns at the EPA or it could simply be a move

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[28] EPA Website – Working draft "Framework for Integrating Environmental Justice" 6/16/05, located at http://www.epa.gov/compliance/resources/publications/data/planning/strategicplan/ej/framework-strategicplan-publiccomment.pdf page 4, accessed on April 20, 2006

[29] Jenner & Block Website – EPA's Draft Environmental Justice Strategic Plan Excludes Race and Class as Leading Factors, Chad Bell, Aug 1st 2005, located at http://www.jenner.com/files/tbl_s20Publications%5CRelatedDocumentsPDFs1252%5C1072%5CEPAs_Draft_Environmental_Justice_Strategic_Plan.pdf accessed on April 20, 2006

to a more comprehensive assessment of which communities require environmental justice actions. This point indicates that the language could either be detracting from or expanding the environmental justice movement. Second, the report finds that leaving discretion to regional offices to identify environmental justice targets, objectives and methods of addressing environmental justice concerns will result in considerable variance between regions. Third, if the definition change expands the number of communities that could be considered as high priority areas, then more businesses will be exposed to increased enforcement in the name of environmental justice. Lastly, the increased reliance on outcomes and results could heighten scrutiny and increase pressure on industries in environmental justice communities to comply. The examination from Jenner & Block illustrates the uncertainty that surround the EPA's draft plan. Most of the uncertainly is connected with the definition change at the foundation of the draft plan. If this draft plan were to be implemented using the original definition of environmental justice it could be more successful at delivering environmental justice results. The plan could have the benefit of delivering more measurable results across the nation, increasing industry compliance and giving each region the flexibility to determine and address their unique environmental justice concerns.

Robert D. Bullard, one of the pioneers of the environmental justice movement calls the EPA draft plan a "Giant Step Backward". His comments to the plan are listed online at the Environmental Justice Resource Center[30]. In addition to what many environmentalists claim about the new definition of environmental justice and the failures of the draft plan, he asserts that;

- The EPA's shortened public comment period did not allow for adequate time for public review of the plan
- The plan fails to reduce existing environmental health threats that disproportionately affect minority and low-income populations, and ignores decades of studies that link environmental hazards, race/class disparities and unequal protection.
- The plan goes against the Congressional mandate that called on the EPA to ensure that none of its funds are used "in contravention of, or to delay the implementation of " Executive Order 12898.
- The plan fails to address how environmental policies and practices result in unfair, unjust, and inequitable outcomes for low-income and minority populations.

Aside from the OIG, Congress and numerous environmentalists and equal rights advocates, there may be even more indications that the EPA is failing to address or circumventing environmental justice. A report by the U.S. Government Accountability Office (GAO) entitled, "Environmental Justice: EPA Should Devote More Attention to Environmental Justice When Developing Clean Air Rules", examined the process in which the EPA drafted and finalized three major Clean Air Act rules[31]. The GAO

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[30] Environmental Justice Resource Center Website – EPA's Draft Environmental Justice Strategic Plan – "A Giant Step Backward", Robert D. Bullard, located at http://www.ejrc.cau.edu/BullardDraftEJStrat.html accessed on April 20, 2006

[31] U.S. Government Accountability Office – "Environmental Justice: EPA Should Devote More Attention to Environmental Justice When Developing Clean Air Rules", located at http://www.gao.gov/new.items/d05289.pdf accessed on April 20, 2006

review recommended that the EPA improve the ability of rule development workgroups to identify environmental justice issues, as well as improve its economic reviews of proposed and final rules to take environmental justice issues into consideration[32]. The GAO examined three major Clean Air Act rules and found that little attention was devoted to environmental justice and the environmental justice concerns were not approached consistently across the three rules[33]. Additionally, the GAO found that there was a lack of staff training and guidance on environmental justice, when environmental justice consideration did occur it was inconsistent, and the EPA has not agreed on the data needed to perform an environmental justice analysis. The GAO also expressed that five different Executive Orders are discussed in the rulemaking procedure, but environmental justice issues are only discussed if necessary and appropriate. The GAO recommended that the EPA 1) require environmental justice issues to be discussed during rulemaking workgroups, 2) provide workgroup members with environmental justice training, 3) identify data and techniques to support environmental justice impact assessment data, and 4) provide more thorough response to public comment on environmental justice.

Some EPA officials disagreed with the GAO recommendations because they believe the agency pays enough attention to environmental justice[34]. These EPA officials also believe that the economic reviews performed did consider environmental justice impacts. The EPA further maintained that some of the rules the GAO examined did not create EJ issues, though they did not publish the evidence supporting this claim[35].

CASE STUDIES

To illustrate the severe need to address environmental justice in low-income and minority communities, several case studies will be examined. These case studies will display the severity of the situation that faces many Americans. The environmental risk born by the affected communities is substantially higher than the risk born by the average American. In every instance, the people who are too poor to move, fight, or who lack political power to correct the disparities are adversely impacted.

It is important to remember four main issues with respect to environmental justice. As per the 1994 Executive Order 12898, an 'affected community' would be defined as a minority or low-income population. First, does the affected community have a disparate impact with respect to environmental pollution, compared to the majority of people? Second, is the affected community able to access to information and resources about pollution and resulting health effects? Third, does the affected community have the coordinating and educational skills to organize people around key issues in order to effectively contribute to public participation efforts? Lastly, is there an imbalance of power between the affected community and the source of the pollution or political actors. These four issues can help identify and analyze if an environmental justice scenario exists.

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[32] Staff, Air Pollutant Consultant, Volume 15, Issue 6, 2005, Technical Resources Section, p. 1.11-1.13
[33] IBID, Air Pollutant Consultant, p. 1.11
[34] Environmental News Service Website – EPA Fails Environmental Justice Test", August 5, 2005, located at http://www.ens-newswire.com/ens/aug2005/2005-08-05-09.asp accessed on April 20, 2006
[35] IBID, Environmental News Service

Chester City, Pennsylvania

Chester City, PA occupies less than 5 square miles of land located about 15 miles south of Philadelphia. The city is located on the Delaware River, which made it ideal for manufacturing during the industrial era. The area had a growing economy until the 1940's, when the industrial age ended and manufacturing fizzled. After 1950 Chester City began to fail, jobs declined by over 30%, the affluent moved away, and the population declined rapidly. By the 1990's Chester City was comprised of almost 65% African Americans. Chester City also suffered from a long history of political corruption and manipulation, stemming from the influence of organized crime on local politics.

According to the 2000 U.S. Census data, the City of Chester has about 37,000 people, 75.7% are African American, 18.9% are White and 5.4% are Hispanic or Latino[36]. Comparatively, the State of Pennsylvania is composed of 85% whites, 10% African Americans, and 3.2% Hispanics or Latinos[37]. This datum indicates that Chester City has a higher concentration of minority African Americans than the rest of the state. Only 68.7% of Chester residents have high school diplomas compared to 82% in the rest of the State of Pennsylvania. Education can be a prime indicator of income-earning potential. The mean household income for a Chester resident is about $25,703 compared to $40,106 for the rest of the state. About 27.2% of the people in Chester are living below the poverty line, compared to only 11% in the rest of Pennsylvania. Additionally, mortality rates in Chester are 40% higher, and infant mortality rates and low birth rates are 100% higher than in the white suburbs. A picture emerges of Chester as a low-income and minority community that is dramatically different than the average community in the State of Pennsylvania[38].

Residents of Chester are burdened by numerous polluting facilities interspersed among residential areas. These industrial waste facilities were located in Chester because the minority neighborhoods "had less political clout to keep them {industrial waste facilities} from getting the necessary permits than more affluent and whiter communities"[39]. This phenomenon of waste facilities being located in minority and low-income areas has been documented by numerous sources[40]. Free market economics and the Not In My Back Yard (NIMBY) phenomenon serve to perpetuate the problem as property values plummet with the incoming industrial waste facilities. Low property prices make housing in these areas affordable to low-income populations, who will travel to places like Chester to find housing that fits their budgets. Affluent populations will move out of the area as waste facilities move in, in hopes of avoiding the risk and nuisance that these facilities create. The influx of poor people and the flight of the wealthy erodes the tax base of the area, making it more attractive for local politicians to support permitting more waste facilities locating in the area. Politicians see these

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[36] U.S. Census Bureau Online – Chester City, PA Quick Facts located at http://quickfacts.census.gov/qfd/states/42/4213208.html accessed on April 21, 2006

[37] IBID, Census

[38] Public Interest Law Center of Philadelphia Website – Environmental Health and Justice - "Jerome Balter Retires", located at http://www.pilcop.org/ehj.mpl accessed on April 21, 2006

[39] IBID, Public Interest Law Center of Philadelphia

[40] Bullard, RD, *Dumping in Dixie: Race, Class, and Environmental Quality*, (1990); Pasto Jr. et al, ""Which Came First? Toxic Facilities, Minority Move-In, and Environmental Justice", Journal of Urban Affairs, Vol.23, Issue 1, 2001; Luke W. Cole, "Empowerment as the Key to Environmental Protection: The Need for Environmental Poverty Law", Ecology Law Quarterly, Vol. 19, (1992)

facilities as creating jobs for the poor and bringing tax dollars into the city, which boosts the local economy. However, the increase in tax revenue and jobs comes with a severe public health risk associated with the operations of these polluting facilities.

Chester City is home to many polluting operations. Witco Chemical and Scott Paper surround the city while British Petroleum and Sunoco Oil operate to the east of the city. However, much of the environmental risks in Chester City stems from waste treatment facilities located in the area. The Delaware Resource Recovery Facility is the 7th largest waste incinerator in the nation. It is operated by Westinghouse and is located in Chester City. This incinerator burns trash from PA, NJ, NY, DE, and OH. The incinerator is a mass-burn facility, which means that the trash is not sorted before it is burned. Trash trucks dump their cargo into a large hanger and it waits there for its turn to go to the furnace. Sources of pollution from the Westinghouse incinerator include the burnt ash byproduct and air pollution. The ash is buried in a landfill, but the polluted air escapes. Air pollutant emissions include HCL, volatile organic compounds, dioxins, nitrous oxides, sulfur oxides, lead, and other heavy metals[41]. The Westinghouse incinerator was fined over $400,000 in 1997 for exceeding regulatory limits of CO and SO_2 set up by the Clean Air Act[42]. In 1997 American Ref-Fuel purchased the Westinghouse incinerator.

The DELCORA Wastewater Treatment Facility in Chester treats over 35 million gallons of wastewater and sewage per day. DELCORA processes 90% of the wastewater from Delaware County as well as industrial effluents from Scott Paper, Sunoco and British Petroleum Oil refineries, which contain high levels of benzene and petroleum. Sludge is creates from the wastewater treatment process, which DELCORA burns, releasing HCL, sulfur oxides, nitrous oxides, dioxins, volatile organic compounds, and extremely high levels of arsenic.

Thermal Pure Systems, an infectious medical waste treatment facility, is also located in Chester City. Thermal Pure treats waste from hospitals, morgues, doctor's offices and veterinarians. The treatment process is carried out through an autoclave, which sterilizes the waste using steam and pressure, so the waste can then be buried in a landfill or incinerated. While there are few harmful byproducts that occur from the autoclave process, Thermal Pure has exposed Chester City residents to an undue burden. This burden occurred when a boiler broke at Thermal Pure and 33 trucks of infectious waste were forced to sit out in the July sun, near residential areas, for over 24 hours. Thermal Pure was temporarily forced to limit its capacity from 288 tons per day to only 15 tons per day as a result of this incident.

Soil Remediation Services was granted a permit by the Department of Environmental Protection to do business in Chester City. Though this facility was never built, it was planned to have the capacity to treat over 900 tons of petroleum-contaminating soil per day. Treatment consists of burning the soil to release its contaminants leaving the burnt soil ready for landfill burial. Some of the pollutants that would have been emitted during the burning at Soil Remediation Services include particulate matter, carbon monoxide, nitrogen oxides, sulfur dioxide, volatile organic

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[41] Environmental Justice Network Website – "Waste Treatment Facilities in Chester", Andy Murray, located in http://www.ejnet.org/chester/facilities.html accessed on April 20, 2006

[42] EPA Website – "Westinghouse to pay $400,000 for Clean Air Violations", located at http://www.epa.gov/Region3/r3press/pr97229.htm accessed on April 20, 2006

compounds, benzene, toluene, and benzo (a) pyrene. In 1996, The Cherokee Environmental Group was also trying to locate a soil bio-remediation facility in Chester City. This facility would have brought an additional 950 tons of contaminated soil into Chester per day.

In 1992 EPA's Region III began the "Environmental Risk Study for the City of Chester, PA" to study and quantify the risks and effects of pollution exposure in Chester City[43]. The study found that:

1. Over 60% of the children's blood lead samples were above the Center for Disease Control (CDC) recommended action level of 10 ug/dL.
2. Both cancer and non-cancer risks from pollution sources at location in the city of Chester exceed levels that the U.S. EPA believes are acceptable. Air emissions from facilities in and around Chester provide a component of the cancer and non-cancer risk to the citizens of Chester.
3. The potential health risk from regularly eating contaminated fish from streams in Chester and the Delaware River is unacceptably high.[44]

The environmental risk assessment was also accompanied by recommendations which included an aggressive lead paint education and awareness program, increased inspections and enforcement actions on the polluting facilities in Chester, voluntary emission reduction programs initiated, and a public awareness program about the state mandated ban on fishing[45].

Zulene Mayfield of the citizens action group, Chester Residents Concerned for Quality Living (CRCQL) took the PA Department of Environmental Protection (PADEP) to federal court charging the PADEP with racial discrimination in its permitting process of the Soil Remediation Services (SRS) facility. Chester Residents Concerned for Quality Living v. Seif, 132 F.3D 925 (1997), was filed under Title VI of the 1964 Civil Rights Act. The District Court found that the plaintiff had failed to prove intentional discrimination on the part of the PA DEP, in addition to asserting that no private right of action exists under Title VI of the Civil Rights Act that the CRCQL could enforce. The Court of Appeals held that the plaintiffs could maintain an action under discriminatory effect regulation stipulated by federal administrative agencies under the Title VI of the Civil Rights Act of 1964. The Supreme Court later sent the judgment back to the U.S. Court of Appeals with instructions to dismiss the case. The instructions to dismiss resulted because the permit for the facility was revoked in 1998, so the issue became moot.

King William Reservoir in Virginia

The King William Reservoir is a new dam in the Newport News region of Virginia, proposed in 1993 by the VA Region Raw Water Study Group. This dam is supposed to provide an adequate supply of drinking water for the developing lower Virginia peninsula, New Kent and King William Counties. The dam is supposed to increase the water supply for these counties by 25%, by constructing a 1,500 acre

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[43] EPA Website – "Environmental Risk Study for the City of Chester, PA" located at http://www.epa.gov/region3/environmental_justice/ChesterEnvironmentalRiskStudy6-1995.pdf accessed on April 21, 2006

[44] IBID, EPA Chester Risk Study

[45] IBID, EPA Chester Risk Study

impoundment on King William County's Cohoke Creek. Since the creek does not have enough water to fill the reservoir, a pumping system will be developed to divert water from the Mattoponi River during high flow periods. The water supply in this region is fresh, not brackish, which makes this location ideal for obtaining low cost potable water. The State Water Control Board granted a Virginia Water Protection Permit for the dam in 1997.

The environmental impact of the King William Reservoir is significant. Over 400 acres of natural wetlands, which are critical habitats for a variety of species, would be destroyed. 21 miles of free flowing streams will be inundated and an additional 187 acres of downstream wetlands will be degraded due to decreased water flow. One of the State's most important spawning grounds for North American Shad would be negatively impacted, reducing the ability for the Shad to survive. There are also two rare and threatened plant species in the region that will be adversely impacted by the reservoir, the sensitive joint-vetch and the whorled pagonia orchid. The Chesapeake Bay could also be adversely impacted by the reservoir project. The cultural impact of the dam will also negatively impact minority and low-income populations. The Mattaponi Native American Indian tribe is dependent on the shad population and has sacred land in the area that will be flooded by the proposed dam. In addition, the Pumunkey and Upper Mattaponi tribes will also be affected. The Mattaponi Indian Reservation is one of the oldest tribal sovereign governments in the country, stemming from a 1677 treaty between the colony of Virginia and the Mattaponi. Many citizen and environmental groups have sprung up to fight the reservoir project, some of these include the Alliance to Save the Mattaponi, Archaeological Conservatory, Chesapeake Bay Foundation, Environmental Defense Foundation, Sierra Club, Southern Environmental Law Center, National Trust for Historic Preservation, Georgetown University Law Center, etc.

In order to build anything on federally protected wetlands, a permit under the federal Clean Water Act must be obtained from the U.S. Army Corps of Engineers. In 1999, Corps Norfolk District engineer Colonel Allan B. Carroll, denied the permit for the Reservoir. This denial was on the grounds that Newport News overstated its future water supply needs, this reported need for water was the primary reason cited for building the reservoir. Colonel Carroll cited a study that estimated the region's population would need 17 gallons a day by 2040, not the 39 gallons that Newport News stated. In 2001, Colonel Carroll submitted his Final Recommended Record of Decision to deny the permit, which stated that the reservoir would degrade waters, wetland resources, and negatively impact the Mattaponi Indian Tribe. He also stated that Newport News had greatly inflated their water supply needs. The EPA went on record to support Colonel Carroll's decision to deny the permit. Under Section 404 of the Clean Water Act, the EPA could deny the permit if the corps had permitted it. Their denial could be on the grounds that the reservoir had negative environmental impacts and that it was not the least-damaging practicable alternative. The U.S Fish and Wildlife service also objected to the reservoir for similar reasons. According to a 1999 study by the Army Corps of Engineers stated that,

> "Because the proposed reservoir is located between Virginia's only two American Indian Reservations, and the proposed intake is located upstream of the Mattaponi Reservation, the project has the potential to result in disproportionately

high and adverse environmental effects to this minority population as described by Executive Order 12898"[46]

Due to complaints by then-Governor James Gilmore, the permit decision was elevated up the Army Corps chain-of-command. The decision was referred over to the North Atlantic Division (NAD) of the Army Corps of Engineers, based in New York. In 2002, NAD stated that it planned to reverse Colonel Carroll's decision and grant the permit for the King William Reservoir. The project then needed a permit from the Virginia Marine Resources Commission, who denied the permit in 2003 on a 6-2 decision citing the adverse impact on the Shad population. Newport News challenged this decision in court and won the right to another permit hearing before the commission. In 2004, Senator Warner changed the personnel structure of the Virginia Marine Resource Commission, subsequently, the new committee granted the reservoir permit[47]. The decision of the Committee went against the recommendations of its own staff and the Virginia Institute of Marine Sciences, both reject reports sponsored by Newport News that stated there would be virtually no impact on the Shad population[48].

There are several alternatives to the reservoir that were proposed in an environmental impact statement that was required to be performed under the National Environmental Protection Act (NEPA). These alternative include:

- A reservoir on Ware Creek with a pumpover from the Pumunkey River
- A reservoir on the Black Creek with a pumpover from the Pumunkey River
- Fresh groundwater development
- Groundwater desalination in the Newport News Waterworks distribution are
- Use water restriction
- No action[49]

These other available alternatives have decreased environmental impacts and environmental justice issues. Additionally, Colonel Carroll suggested that Newport News could purchase water from Richmond or Norfolk or simply advise residents to conserve water. In mid-2005, the Army Corps of Engineers issued a draft approval of the permit for the reservoir, which was subject to actions by the U.S. Fish and Wildlife Service. By November of 2005 the permit was officially granted.

The most significant course of action remaining to prevent the reservoir lies in the Mattaponi's 1677 Treaty of Middle Plantation. The VA Supreme Court ruled that the Mattaponi could enforce the treaty against the city of Newport News, since the reservoir project violates that treaty. Many other environmental organizations, like the Sierra Club, have pledged to fight the King William Reservoir. Another course of action to prevent the reservoir from being built has to do with procedural error concerning the

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[46] EPA Website – Office of Environmental Justice, "1998 Environmental Justice Biennial Report: Moving Towards Collaborative and Constructive Problem-Solving", p. 5.2, EPA/300-R-99-004, located at http://www.epa.gov/compliance/resources/publications/ej/annual_project-reports/ej-biennial-report-1998.pdf accessed on April 24, 2006

[47] Virginia General Assembly Conservation Scorecard 2004, p.6 – located at http://www.valcv.org/valcvdocs/VALCV2004ConservationScorecard.pdf accessed on May 5, 2006

[48] Southern Environmental Law Center Website – located at http://www.southernenvironment.org/cases/king_william/timeline.htm accessed on May 5, 2006

[49] Virginia Places website – located at http://www.virginiaplaces.org/watersheds/kwreservoir.html accessed on May 5, 2006

federally mandated environmental impact statement. A supplemental environmental impact statement was requested after new evidence about the environmental impacts of the reservoir was brought forward, but the Corps of Engineers never completed the supplemental statement.

Many opponents of the King William Reservoir believe that the public participation process in many of the permit proceeding was sub-par. However, real benefits were realized through the public participation efforts that were put forth. These benefits include a 33% reduction in the size of the reservoir, preservation of 216 acres of wetlands, movement of the reservoir 1.7 miles upstream, an 8-year study of the spawning behavior of the Shad, an annual 2 month water pumping ban during Shad spawning season, the creation of 800 acres of man made wetlands, excavation of 75 archeological sites that will be flooded, identification of environmental justice issues, and the education of the community. The excavations of the American Indian sites are scheduled to begin in April of 2006, to the objection of the Mattaponi, Pamunkey and Upper Mattaponi Indian tribes. These tribes have refused to sign the excavation agreement with the Corps of Engineers.

The King William Reservoir case is an example of how political pressure can undermine environmental protection, create environmental justice situations and oppose the desires of the citizen constituency. In this case, the political pressure comes from development groups (like the Peninsula Association of Realtors, Hampton Roads Planning District Commission, Canon Industries, Hampton Roads Partnership, Chamber of Commerce, and the Peninsula Board of Home Builders) who urge politicians to make suburban lands hospitable to future development[50]. The reservoir project only benefits developing communities and not older cities that are already established. Additionally, these new developments will encourage sprawl and urban flight, erode the tax base of older communities, and cause businesses and job opportunities to move away from established communities. Political actors continually worked to use their power to pressure decision makers into endorsing the reservoir project, which is explicitly evident through the Army Corps of Engineers and the Virginia Marine Resources Commission permitting processes. The American Indian tribes in question are a low-income and minority population who do not have the resources to fight the powerful local and state government. The reservoir project exposes them to considerable environmental risk, disproportionate to the rest of the Virginia or United States populations. Their land will be destroyed and the fish that they are dependent on for food and cultural identity are going to decline. Citizens were undermined because the contractual agreement for this reservoir was signed between the City of Newport News and King William County before the citizens were ever made aware of the project[51]. This project has taken 12 years and $23 million so far without a single drop of water being delivered to a VA resident[52]. The final project is expected to cost over $200 million and will take at least another 12

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[50] The Bay Journal Website – "Proposed reservoir opens floodgate of opposition", Sharon Saari, located at http://www.bayjournal.com/article.cfm?article=2297&print=yes accessed on April 24, 2006

[51] Sierra Club Website – "Testimony of Glen Besa of the Sierra Club Before the House Resources' Task Force on NEPA", Sept 17th 2005, located at http://www.sierraclub.org/lookbeforeyouleap/testimony_besa.pdf accessed on April 24, 2006

[52] Hampton Roads Business Journal Website – Inside Business, Janet Dunphy, "Treading Water: 12-year, $23 million Struggle for Reservoir Continues", Sept 26th 2005, located at http://www.insidebiz.com/output.cfm?ID=3901502 accessed on April 24, 2006

years to complete[53]. Taxpayers in VA are paying for this exorbitant project, but not receiving any benefits, nor has any real need been established to justify the expense.

Saint Lawrence Cement in Camden, NJ

In 2000, the City of Camden, NJ had a population of about 80,000, approximately 53% are African American, 38% are Latino or Hispanic and 16% are white[54]. The rest of New Jersey is composed of about only 13.6% African Americans, 13% Latino or Hispanic and 72% white[55]. This illustrates how Camden is a predominantly minority community compared to the rest of the State of New Jersey. Additionally, Camden is very poor with 35.5% of people living below the poverty line, compared to only 8.5% living below the poverty line in the State of NJ as a whole[56]. Median household income is about $23,421in Camden an $55,146 in the rest of NJ, and only 51% of Camden residents have a high school diploma while 82% of New Jersey residents have graduated from high school[57]. These data suggest that in addition to being a minority community, Camden is considerably lower in income and educational status than the rest of the state.

Northern Camden, which is primarily residential and commercial, has been the target of many federal improvement efforts. The area has been designated as a Federal Empowerment Zone by the U.S. Department of Housing and Urban Development and has also been recognized as a redevelopment priority by the Governor's Urban Coordinating council. The southern section of Camden, which has had a long history of industrial activity, few revitalization efforts have been made. South Camden, known as Waterfront South, has two EPA designated Superfund sites, several contaminated and abandoned industrial sites (Brownfields) and many currently operating facilities including chemical companies, waste facilities, food processing companies, automotive shops, and a petroleum coke transfer station[58]. Additionally, the New Jersey Department of Environmental Protection has granted permits to allow the operation of a regional sewage treatment plant (Camden County Municipal Utilities Authority), a trash-to-steam incinerator (Camden County Resource Recovery Facility), and a co-generation power plant (Camden Cogen Power Plant)[59]. As a result, Waterfront South is the single neighborhood out of 23 Camden neighborhoods, which is home to 20% of the city's contaminated sites and has on average more than twice the number of facilities with air pollution emission permits than the average zip code[60].

The Saint Lawrence Cement Company (SLC) is a cement material supplier based in Montreal Canada. The Camden branch of SLC grinds granulated blast furnace slag, a

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[53] IBID, Hampton Roads
[54] U.S. Census Bureau Website – Camden City, NJ, Quickfacts 2000, located at http://quickfacts.census.gov/qfd/states/34/3410000.html accessed on April 24, 2006
[55] IBID, Census Bureau
[56] IBID, Census Bureau
[57] IBID, Census Bureau
[58] South Camden Citizens In Action v. NJDEP, S. Camden I, 145 F. Supp. 2d, a copy is located at http://caselaw.lp.findlaw.com/scripts/getcase.pl?navby=search&case=/data2/circs/3rd/012224.html accessed on April 24, 2006
[59] IBID, South Camden v. NJDEP
[60] IBID, South Camden v. NJDEP

byproduct of the steel manufacturing industry, into a substitute for the use of portland cement in concrete. SLC had completed a long permitting process with the NJDEP, which included involving and informing the community in the planning, construction and proposed operations of the facility[61]. SLC organized a Community Advisory Panel to discuss issues about the facility and hired independent technical experts selected by the community, who approved the facility[62]. The NJDEP also gave public notice of a public hearing over SLC in which 120 community members attended and some submitted written comments[63].

In February of 2001, a group of Camden residents formed an organization called the South Camden Citizens in Action (SCCIA). The SCCIA filed suit in the District Court against the New Jersey Department of Environmental Protection (NJDEP) for issuing air permits to SLC to operate in South Camden. The SCCIA argued that the NJDEP permit issuance was discriminatory since the neighborhood was predominantly minority and low-income and sought injunctive and declaratory relief under Title VI of the Civil Rights Act of 1964. However, the Supreme Court's Ruling in a related case, Alexander v. Sandoval, proved that there is no private right of action under Title VI, so the South Camden v. NJDEP case became moot. The SCCIA later brought the NJDEP to District Court arguing that 42 U.S.C. §1983 provided a vehicle to remedy violations of the EPA's Title VI regulations. 42 U.S.C. § 1983 states that:

> "Every person who, under color of any statute, ordinance, regulation, custom, or usage, of any State or Territory or the District of Columbia, subjects, or causes to be subjected, any citizen of the United States or other person within the jurisdiction thereof to the deprivation of any rights, privileges, or immunities secured by the Constitution and laws, shall be liable to the party injured in an action at law, suit in equity, or other proper proceeding for redress . . ."

The District Court held the SCCIA's new approach, but the NJDEP appealed and the Court of Appeals sided with the defendant. SCCIA continued its pursuit of the NJDEP and SLC by alleging that the SLC permit deteriorated the quality and quantity of the housing stock in the Waterfront South neighborhood, which had a discriminatory effect on residents of that neighborhood. This argument was based on the Fair Housing Act through Title VIII of the Civil Rights Act of 1968. However, the District Court disagreed to this approach. The SCCIA also asserted that the SLC operations created a public nuisance to the residents of the Waterfront South community through high volume of diesel trucks, fume emission and dust, soot and vapors. This approach was also dismissed. Finally, two approaches by the SCCIA survived District Court motions. The SCCIA claimed that the NJDEP intentionally discriminated against the members of the SCCIA and other minority members of the Waterfront South community on the basis of race, color, and national origin in violation of both section 60 of Title VI of the Civil Rights Act of 1964 and the Equal Protection Clause of the Fourteenth Amendment. The other approach was that SLC created a private nuisance to the residents of Waterfront South through its operations. Unfortunately, a federal judge dismissed the lawsuit in April of 2006.

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[61] Luria A, "Constitutionally-Based Environmental Justice Suits and their Likely Negative Environmental and Economic Impact", University of Pennsylvania Journal of Constitutional Law, Vol. 7:2, 2004, p.596
[62] IBID, Luria, p. 596
[63] IBID, Luria, p. 597

Monsanto in Anniston, Alabama

In December of 1998, an EPA official received a letter from the West Anniston Environmental Justice Task Force, now called the Citizens Against Pollution (CAP), requesting that the EPA investigate and take action to address the PCB (polychlorinated biphenyls) contamination in Anniston, Alabama. It was indicated that this PCB contamination might be linked to the Solutia Chemical plant located in Anniston, Alabama. The Solutia plant originated in 1917 as the Southern Manganese Corporation and was producing PCBs by 1920. In 1930, Southern Manganese became the Swann Corporation and in 1935 Monsanto purchased Swann. By the 1970s Monsanto stopped producing PCBs shortly before the EPA banned the substance. In 1997, Monsanto renamed the chemical division of the Anniston plant 'Solutia'.

According to an EPA document, Monsanto disposed of waste in two landfills located on the property. The west end landfill (WEL) was an unlined landfill used to dispose of hazardous and nonhazardous waste from the mid-1930s until 1961[64]. Subsequently, the south end landfill (SEL) was utilized until 1988. The SEL contained 10 unlined waste cells for hazardous and nonhazardous waste[65]. In addition, Monsanto dumped significant amounts of waste directly into the nearby Snow Creek. Tests by the Alabama Department of Health, Alabama Department of Environmental Management, the Agency for Toxic Substances and Disease Registry and the EPA all confirm that PCB contamination in the Anniston area was due to the operations of the Monsanto plant[66].

The adverse health and environmental effects resulting from the PCB contamination are far-reaching. A report from the Agency for Toxic Substances and Disease Registry concluded that;

- PCBs in soil in some areas of Anniston present a public health hazard based on the potential for chronic cancerous and noncancerous health effects. Furthermore, residential soils in some areas of Anniston with higher levels of PCBs may present a public health hazard for thyroid and neurodevelopmental effects for intermediate exposure durations (less than 1 year of exposure).
- The reports of elevated blood PCBs in young children support the conclusion that exposures to PCBs have not ceased. The magnitude of PCB levels in blood in older persons (i.e., 41 of the persons aged 38 years or older had levels greater than 100 g/L) suggests that PCB exposures may have been more severe in the past. The higher proportion of detections of PCBs in the blood of older persons suggests that PCB exposures were more widespread in the past.[67]

The same report noted that 73% of the people who had detectable blood levels of PCBs lived in Anniston and that the average PCB blood level for the 2,970 people tested was

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[64] EPA Website - p. 2
[65] IBID, EPA Website, p.2
[66] IBID, EPA Website, p. 3
[67] ATSDR Website – Health Consultation – Public Comment Release, "Evaluation of Soil, Blood & Air Data From Anniston, AL & Calhoun County AL" located at http://www.atsdr.cdc.gov/HAC/PHA/annpc/ann_p3.html accessed on April 25, 2006

14.2 μg/L or 14.2 ppb[68]. The average PCB blood level for a statistical sample of Americans is between 3.7 to 6.8 ppb[69]. This means that the average Anniston resident has a PCB blood level 7.4 ppb higher than the upper limits of the national average! Some ways that residents could have been exposed to PCBs is through growing vegetables in PCB contaminated soil, eating PCB laden fish from contaminated local streams, and breathing contaminated air. PCBs are considered a probable human carcinogen by the EPA and the World Health Organization, and can cause other adverse health effects.

According to the U.S. Census Bureau the population of Anniston in Calhoun County, Alabama is not predominately minority, the population is about 79% white and 18% African American[70]. However, about 40% of Anniston residents make less than $25,000 per year, 12.4% of families and 16.1% of individuals live below the poverty line in Anniston[71]. This qualifies Anniston as a possible environmental justice neighborhood since it is a low-income area.

As early as 1952, Monsanto began to outfit their PCB workers with protective gear at the request of their own health director and the U.S. Public Health Service. In 1966, Monsanto hired Mississippi State University biologist, Denzel Ferguson to conduct some studies around the Anniston facility. He reported to Monsanto that all 25 of the fish that he tested lost equilibrium and turned on their sides within 10 seconds and died within 3.5 minutes of being submerged into the creek where Monsanto was dumping PCBs[72]. Ferguson urged Monsanto to stop dumping into the creek, which ran through residential areas, but the company denied his requests. Records referenced in a Washington Post article indicate that at the time Monsanto was releasing 50,000 pounds of PCBs into the creek and burying 1million pounds of PCB laden waste in unlined landfills each year[73]. As a result, the Snow Creek had become totally devoid of aquatic life and the larger creek that the Snow Creek fed into was producing PCB contaminated fish. In the 1970's, amidst a fury of federal controversy over PCB's, Monsanto confidentially disclosed information to the Alabama Water Improvement Commission about the PCB dumping in the Snow Creek. Monsanto began to slowly add pollution controls to limit PCB releases in the 1970's, and eventually moved its PCB operations to Illinois. In the 80's and 90's Monsanto began to quietly buy up property in the Anniston area and perform clean-ups.

A 2002 Washington Post article reported that,

> "for nearly 40 years, while producing the now-banned industrial coolants known as PCBs at a local factory, Monsanto Co. routinely discharged toxic waste into a west Anniston creek and dumped millions of pounds of PCBs into oozing open-pit landfills. And thousands of pages of Monsanto documents -- many emblazoned with warnings such as "CONFIDENTIAL: Read and Destroy" --

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[68] IBID, ATSDR Website, Health Consultation

[69] ATSDR Website – Exposure Investigation Report, "Solutia Incorporated/Monsanto Company – Anniston, AL & Calhoun County, AL", located at http://www.atsdr.cdc.gov/HAC/PHA/solutia/sol_p2.html accessed on April 25, 2006

[70] U.S. Census Website – Calhoun County, Anniston, Alabama MSA, located at http://censtats.census.gov/data/AL/390010450.pdf accessed on April 25, 2006

[71] IBID, Census Website

[72] Grunwald M, "Monsanto Hid Decades of Pollution: PCBs Drenched Ala Town, But No One Was Ever Told", Washington Post, January 1st 2002

[73] Grunwald M, "Monsanto Hid Decades of Pollution: PCBs Drenched Ala Town, But No One Was Ever Told", Washington Post, January 1st 2002

show that for decades, the corporate giant concealed what it did and what it knew."[74]

Other sources claim that

"In the mid-fifties Monsanto researchers and executives began writing confidential memos describing their fears about the chemical's toxic effects, but they drafted plans for continuing to sell them despite these suspicions"[75]

The most hotly contested issue regarding Monsanto is whether the company had knowledge about the adverse health impacts of the PCB dumping, and intentionally withheld the information from the public. Countless confidential internal documents, requested by the one-time Senator and current plaintiff's attorney, Donald Stewart, attested that they did in fact know about the toxic effects of the PCB dumping, and never informed the public. The Monsanto site is currently listed by the EPA as a Superfund Alternative Site, not on the National Priority List for cleanup.

A series of lawsuits brought by residents of Anniston, against Monsanto ensued including Owens v. Monsanto, which settled in 2001 for $43 million. In another case, Abernathy v. Monsanto, the jury originally returned guilty verdicts establishing liability on Monsanto on all six counts including negligence, wantonness, nuisance, suppression of the truth, trespass, and outrage. Abernathy v. Monsanto was appealed and is now called Monsanto v. Bowie. The Bowie court sided against Monsanto in February of 2002, however monetary awards have not yet been decided. There was also a settlement reached between Monsanto, the EPA and the U.S. Justice Department to investigate and address the PCB contamination in Anniston, AL[76]. Currently there are more than 25,000 people in the Anniston are that have sued or are suing Monsanto in regards to PCBs, which includes 15,000 who are suing in Birmingham federal court[77]. Monsanto has paid over $85 million to clean up Anniston and settle some related lawsuits, but stands to pay a lot more.

Abex Superfund Site in Portsmouth, VA

The Abex Corporation operated a brass and bronze foundry on a 2-acre plot of land located in a residential area of Portsmouth, VA from 1928 to 1978. Abex mostly made brake shoes and bearings for railroad cars. As a result of their operations, 10 pounds per day of lead was released into the air and 3,500 cubic yards of lead contaminated furnace sand were dumped into a makeshift landfill on the property each day. In 1984, the EPA found that the lead levels in the landfill area were extremely high. By 1986 the EPA had determined that nearby residential lots had very high lead levels of 13,000 ppm, which exceeded the EPA's legal standard of 500 ppm, and that contamination was widespread in all areas inside the Abex property. The lead was being released into residential areas through emissions from the foundry. The EPA and the

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[74] IBID, Washington Post

[75] Belies N, "What Monsanto Knew", The Nation, May 29th 2000, p. 18-22

[76] Department of Justice Website – "United States Announces Settlement for Comprehensive Study of PCB contamination in Anniston, Alabama", Oct 23rd 2002, located at http://www.annistonstar.com/news/2002/as-calhoun-0223-ebluemink-2b22u2533.htm accessed on April 25, 2006

[77] Bluemink E, "Jury Rules Against Monsanto" Anniston Star Press, Feb. 23rd 2002, located at http://www.annistonstar.com/news/2002/as-calhoun-0223-ebluemink-2b22u2533.htm accessed on April 25, 2006

Agency for Toxic Substances and Disease Registry (ATSDR) declared surface soil lead contamination in nearby residential properties a public health hazard.[78]

In 1986, Abex signed a CERCLA (Comprehensive Environmental Response Compensation and Liability Act) Emergency Consent Order to stabilize the threat that the plant posed to nearby residents. Abex proceeded to level portions of the site, surrounded the site with barbed wire fencing, covered the old landfill with asphalt, excavated and filled in other areas, and revegetated the area. In 1990 Abex and the EPA agreed that the corporation would conduct a remedial investigation/feasibility study to determine the extent of contamination and identify remediation strategies. This study was completed in 1992 and after some revisions was approved by the EPA in 1995. The remediation plan included digging up, treating and transporting the contaminated soil on the site, capping residually contaminated areas, replacing excavated areas with clean soil, demolishing the Abex Foundry Building, and temporarily relocating the nearby residents during cleanup work[79]. The first phase of the Abex cleanup began in 2003, the second phase began in 2006. The cost of the cleanup to the Abex Corporation was estimated at $22.1 million[80].

The most pressing health issue at the Abex site was lead. This is due to its known toxicity and because it was so pervasive in and around the site. Lead can cause neurological and learning disabilities and is a probable carcinogen. There were other materials of concern in and around Abex including antimony, nickel, tin, copper, zinc, cadmium, chromium, silver, polynuclear aromatic hydrocarbons, and PCBs. In 1992, 546 neighborhood residents were administered blood tests, twenty-one children displayed mildly elevated blood lead levels and required medical treatment[81].

The largest residential area to be affected by the Abex site was the Washington Park Public Housing Development, which housed 160 families. These families were low-income and living in publicly assisted housing, this qualifies the Abex neighborhood as a potential environmental justice neighborhood. There were also 20 private homes that had high levels of lead in soil. Residents were concerned about the health risks associated with the clean up effort and the effect on property values. Originally in 1994, the EPA had not wanted to relocate the residents of Washington Park, preferring to relocate only private landowners[82]. However, the residents of Washington Park sued on the grounds that the EPA CERLA remedy contributed to long-standing discrimination in the area by requiring the segregated and low-income residents to remain in their homes during the cleanup phase. This case was the first time that a Superfund remedy was

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[78] ATSDR Website – "Health Consultation – Chestnut Street Property Near Abex Lead Site, Portsmouth, VA", located at http://www.atsdr.cdc.gov/HAC/PHA/chest/che_p1.html accessed on April 26, 2006

[79] Virginia Department of Environmental Quality Website – "Abex Corporation Superfund Program Site Fact Sheet", located at http://www.deq.virginia.gov/waste/pdf/superfund/abex.pdf accessed on April 25, 2006

[80] Harper S, "Agreement Clears Way to Begin Cleaning Toxic Portsmouth Site", The Virginian-Pilot, Jan 19th 1996, Local Section, Page B1

[81] IBID, The Virginan-Pilot

[82] Lawyers' Committee for Civil Rights Under Law Website – " Settlement of Washington Park Lawsuit Succeeds in Relocating Residents to Integrated Housing Opportunities and Demolition Public Housing on Superfund Site", located at http://www.lawyerscomm.org/2005website/projects/environmentaljustice/environmentalupdate1.html accessed on April 26, 2006

altered to address racial discrimination[83]. The legal proceedings determined that the residents of the Washington Park Housing complex should be permanently relocated to integrated housing and the existing complex would be demolished. The Washington Park Housing complex was demolished in 2003. Furthermore, the residential area where the Washington Park Housing complex once stood was re-zoned for only commercial and industrial use. Some claim that the Washington Park Housing complex never should have been built near an operating lead foundry to begin with, alleging that the 'Negro' public housing facility was located there in the 1960's because it was built using federal funds[84].

Critics of Environmental Justice in the United States

In 1995, the United States General Accounting Office (GAO), by the request of congress, presented a report entitled "Hazardous and Non-Hazardous Waste: Demographics of People Living Near Waste Facilities"[85]. This report found that minorities and low-income people were not over represented near a majority of the nonhazardous municipal landfills. The study stated that, "for 73% of the metropolitan landfills and 63% of the non-metropolitan landfills, the percentage of minorities living within one mile was lower than the percentage of minorities living in the remainder of the country"[86]. The studies that the GAO examined had varied results. Some affirmed that minority and low-income populations were more likely to be located near waste facilities, while others did not. The GAO cited that the inconsistent results were probably due to the fact that researchers did not have a uniform definition of 'racial minority' and that many different types of waste facilities were observed. The GAO also found that the EPA has not addressed environmental justice concerns in the requirements of locating waste facilities or with respect to public participation in decision making. Bowen & Wells believe that there is a disconnect between the claims of environmental justice advocates and what exists in reality[87]. Bowen and Wells believe that the environmental justice discourse in the United States is based on weak empirical evidence, fails to differentiate between proximity and risk and could be more about fear, blame, and inclusion than about public health. The researchers state that they are not opposed to the environmental justice movement, only that they believe the claims made by its advocates are often exaggerated and not based on sound science.

The authors of this study claim that they studied over 200 articles on environmental justice, of which only 40 used credible research design methods[88]. The authors claim that the data and research methods used in much of the articles examined

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[83] American Bar Association Website – "Residents of Public Housing Project to be Relocated Under Proposed CERCLA Consent Decree", Feb 14, 2000, located at http://www.abanet.org/environ/committees/envtab/ejweb.html accessed on April 25, 2006

[84] OpCit, Lawyers' Committee for Civil Rights Under Law Website

[85] U.S. General Accounting Office Website – "Demographics of People Living Near Waste Facilities", GAO/RCED-95-84, located at http://archive.gao.gov/t2pbat1/154854.pdf accessed on April 24, 2006

[86] IBID, GAO Website, p. 4

[87] Bowen WM & Wells MV, "The Politics and Reality of Environmental Justice: A History and Consideration for Public Administrators and Policy Makers", Public Administration Review, Vol. 62, No. 6, Nov/Dec 2002, p.688-698

[88] IBID, Bowen & Wells, p.690

where inappropriate, inconsistent, inadequately documented, or inherently limited. Furthermore, they assert that comparison areas are often chosen incorrectly, pollution indicators (like the Toxic Release Inventory) are misunderstood, and cause-and-effect relationships are not established[89]. They maintain that many conclusions are likely biased, based on unreliable tests for statistical significance, and generally misleading.

In a related study, Tesh & Williams assert that the environmental justice movement is based on two opposing political approaches, which may be preventing the movement from succeeding[90]. The first form is 'identity politics' which is based on the subjective, experiential knowledge of grassroots members. This approach is largely social in nature and supported by people who are sympathetic to, have experienced, or have perceived to experience environmental justice issues or environmental racism. The second approach is called 'disinterested politics', which is based on objective, expert scientific knowledge. Tesh & Williams maintain that these approaches undermine each other because they are based on different assumptions about the nature of scientific knowledge. They advocate 'social constructionist theory' as a way to combine neutral scientific views with democratic experience-related perspectives. Tesh & Williams note that government decision-making is largely based on neutral science, adding that current environmental justice studies are scientifically weak[91]. They believe that the environmental justice movement could succeed if social constructionist theory is applied to allow scientific approach to be guided by social factors such as current and past racial discrimination, economic inequality and other non-quantifiable factors. Bowen & Wells' findings indicate that the majority of environmental literature is based on identity politics, when disinterested politics is what is needed to make the movement more legitimate.

Bowen & Wells continue by stating that the bulk of environmental justice literature focuses on proximity to environmental hazards instead of exposure to risk. They claim that the best test to determine risk is through tedious risk analysis and prioritization procedures, such as the government's use of 'Community Risk Assessment' procedures. This process categorizes existing hazards then prioritizes them depending on which hazards present the greatest risks. They then assert that most environmental justice studies correlate proximity to a hazard with exposure, which they believe is misleading. This is because it is possible that the hazard is well controlled and that no external exposures exists, therefore there is little or no risk to nearby residents. Of the 43 empirical research studies they examined, only 3 used risk methods, while the other 40 focused on proximity. The authors found that the most compelling evidence indicated that environmental hazards tend to be located in, "slightly lower than average, heavily industrial, working-class neighborhoods."[92] They firmly question if disproportionate proximity to environmental hazards is correlated with adverse public health impacts.

Finally, Bowen & Wells believe that the environmental justice movement may be more about fear and uncertainty about environmentally related disease, desire for procedural inclusion, community empowerment, and casting blame than on a real

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[89] IBID, Bowen & Wells, p.691-694
[90] Tesh SN & Williams BA, "Identity Politics, Disinterested Politics, and Environmental Justice", Polity, Vol. 28, No. 3, Spring 1996, p. 285-305
[91] IBID, Tesh & Williams, p. 304
[92] IBID, Bowen & Wells, p.695

concern for public health. Perhaps partially supporting this theory, Jones & Rainey indicate that African Americans are more likely than their white counterparts to believe that they are being exposed to poorer environmental conditions, suffer related health problems, and think that local governments will fail to effectively and fairly deal with environmental problems in their neighborhoods[93]. However, their research also indicated that the government cares less about environmental problems in black communities, while blacks tend to be more concerned with local environmental problems and poor environmental quality. The findings of Jones & Rainey support the observations of Tesh & Williams who maintain that a purely scientific approach does not account for the shared values and identities of the affected communities. In this sense, the environmental justice movement maybe fueled by fear, but it could be rational fear based on experience or cultural identity.

Bowen & Wells view the environmental justice movement as a political power struggle, which can be illustrated by the faulty scientific means used to achieve a noble, though misleading social end. Whereas Jones & Rainey find that minority populations may be more likely to perceive environmentally related problems because of fear of disease and mistrust of the government. Evidence may indicate that these pessimistic or paranoid perceptions could be related to present or historical experiences with environmental exposures or under-representation by the government. This echoes the assertions of Tesh & Williams who maintain the truth of the environmental justice movement lies somewhere between empirical evidence and social experience. Bowen & Wells correctly assert that environmental justice literature does not concentrate enough on empirical evidence needed to influence government decision-making. However, Tesh & Williams give insight as to the shortcomings of a solely scientific approach, arguing for a method that accounts for both subjective experience-based qualitative data and objective empirical quantitative data.

International Environmental Justice

Environmental justice issues are by no means exclusive to the United States. Globalization, limited barriers to trade, and the proliferation of multinational corporations have worked in concert to shift environmental pollution from industrialized countries to developing nations. Developing countries often sacrifice environmental protection for economic development, in order to achieve a baseline standard of living for their populations. Environmental justice issues can result as industries export wastes or polluting operations to poor regions in developing countries like Africa, South America or Asia. Developed countries, such as members of the Organization for Economic Co-Operation and Development (OECD) have an incentive to export pollution to non-OECD countries because the environmental regulations are weak and the costs are low. Lawrence Summers, then chief economist of the World Bank, wrote in a 1991 internal

[93] Jones RE & Rainey SA, "Examining Linkages Between Race, Environmental Concern, Health, and Justice in A Highly Polluted Community of Color", Journal of Black Studies, Vol. 36, No. 4, March 2006, p.473-496

memo that exporting pollution to developing countries makes economic sense for 3 reasons[94]. These three highly criticized comments are quoted below;

1. "The measurements of the costs of health impairing pollution depends on the foregone earnings from increased morbidity and mortality. From this point of view a given amount of health impairing pollution should be done in the country with the lowest cost, which will be the country with the lowest wages. I think the economic logic behind dumping a load of toxic waste in the lowest wage country is impeccable and we should face up to that.
2. The costs of pollution are likely to be non-linear as the initial increments of pollution probably have very low cost. I've always though that under-populated countries in Africa are vastly UNDER-polluted, their air quality is probably vastly inefficiently low compared to Los Angeles or Mexico City. Only the lamentable facts that so much pollution is generated by non-tradable industries (transport, electrical generation) and that the unit transport costs of solid waste are so high prevent world welfare enhancing trade in air pollution and waste.
3. The demand for a clean environment for aesthetic and health reasons is likely to have very high-income elasticity. The concern over an agent that causes a one in a million change in the odds of prostate cancer is obviously going to be much higher in a country where people survive to get prostate cancer than in a country where under 5 mortality is 200 per thousand. Also, much of the concern over industrial atmosphere discharge is about visibility impairing particulates. These discharges may have very little direct health impact. Clearly trade in goods that embody aesthetic pollution concerns could be welfare enhancing. While production is mobile the consumption of pretty air is a non-tradable."[95]

Bolstering Summers' points, people with high incomes tend to value a clean environmental more, so moving pollution to low income countries avoids the high costs associated with polluting in high-income areas[96]. Developing countries often must make the trade-off between pollution and economic opportunity. Due to the large populations of poor and hungry in developing countries the environment will almost always be sacrificed for the chance to have food, water, shelter and the basic necessities to support life. To prevent developed countries from exporting large quantities of hazardous wastes to developing countries, the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel Convention) was established. This international treaty aims to reduce the generation of hazardous waste within a nation's boarders and limits the movement of hazardous wastes between nations, specifically from developed to developing countries. The treaty encourages sound

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[94] The test of this memo can be found online at the Basel Action Network Website – "Whistle Blower's Corner/Lawrence Summer's 1991 World Bank Memo", located http://www.ban.org/whistle/summers.html accessed on April 27, 2006

[95] IBID, Lawrence Summers Memo

[96] Anand R, "International Environmental Justice: A North South Dimension", International Journal of Politics and Ethics, Vol. 1, issue 4, 2001, p.241

environmental management of toxic wastes as close to the source of generation as possible. Mechanisms are also in place to assist developing countries in managing the hazardous wastes that they create. The Basel Convention or treaty came into force in 1992, however, the United States is the only developed country which has not ratified it.

An example of the gross injustices that are occurring overseas can be gleaned from the electronic waste (e-waste) exports of the United States and their final resting places in Asia. According to the National Safety Council about 20.6 million personal computers became obsolete in the U.S. in 1998, of which only 11% were recycled[97]. A report from the Silicon Valley Toxics Coalition states, "e-waste has become one of the world's fastest growing and most toxic waste streams."[98] According to a report by the Basel Action Network, for every 500 million computers there are 6.32 billion pounds of plastics, 1.58 billion pounds of lead, 3 million pounds of cadmium, 1.9 million pounds of chromium, and 632,000 pounds of mercury[99]. E-wastes can include other hazardous materials like bromated flame-retardants, barium, poly-vinyl chlorides, beryllium, carcinogenic carbon black powder, and phosphor. This report also uncovers that as many as 50%-80% of domestic 'computer recycling' schemes simply ship the materials to Asia to be broken apart by impoverished workers in toxic working conditions.

The Basel Action Network (BAN) produced a documentary film uncovering the environmental justice situation that is taking place in the town of Guiyu, in the Guangdong Province of China[100]. The BAN documentary revealed that since 1995, the town of Guiyu has been transformed from a small and poor rice-growing community to an active e-waste processing center. Neighborhoods have been converted to specialized waste processing units, some process printers, other process plastics, etc. According to BAN, most of the waste in Guiyu originated in the United States. After only one year of e-waste processing the local water supply became so contaminated that drinking water now must be trucked in from 30 kilometers away[101]. Over 100,000 e–waste workers get paid the equivalent of $1.50 a day to rapidly dismantle and segregate various computer and electronic components into their recyclable parts. Some of the hazardous methods used to complete these tasks include;

- Absent of any respiratory protection or protective clothing, workers dismantle toner cartridges full of carbon black, a respiratory irritant and possible human carcinogen. Workers are visibly covered in black soot.
- Absent of any protective clothing or respiratory devices, open burning of copper wires and various computer parts takes place. Black residue is visible all around the vicinity, ash and leftover parts are dumped into the nearby river. The smoke from these open burnings contains brominated and chlorinated dioxins and furans as well as carcinogenic polycyclic aromatic hydrocarbons.

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[97] National Safety Council Website – "Electronic Product Recovery and Recycling Baseline Report" (1999), located at http://www.nsc.org/ehc/epr2/baseline.htm accessed on April 27, 2006

[98] Silicon Valley Toxics Coalition Website – "Clean Computer Campaign – Fourth Annual Computer Report Card", January 9th 2003, p.6, located at http://www.svtc.org/cleancc/pubs/2002report.pdf accessed on April 27, 2006

[99] Basel Action Network – "Exporting Harm: The High-Tech Trashing of Asia"(2002), p.6, transcript located at http://www.ban.org/E-waste/technotrashfinalcomp.pdf accessed on April 27, 2006

[100] IBID, BAN – Exporting Harm: The High-Tech Trashing of Asia"(2002)

[101] IBID, BAN – Exporting Harm, p.16

- Absent of any protective clothing or respiratory devices, workers crack open cathode-ray tubes of monitors exposing copper cores and liberating significant amounts of lead. Un-recyclable parts are dumped into rivers or streets.
- Absent of any respiratory protection or protective clothing, electronic circuit boards are melted to liberate lead solder. This releases toxic lead fumes.
- Absent of any respiratory protection or protective clothing (except for rubber gloves), workers dip stripped electronic circuit boards into open tubs of acid. The sludge that results from this bath is burned to recover small amounts of precious metals, while releasing toxic fumes. Leftover acid is poured into the river. Acidity tests show the pH of the river near the toxic baths was 0, the strongest level of acidity.
- Absent of any respiratory protection or protective clothing, children are employed to chip plastics into small pieces and sort them by color. Plastics are then burned in small poorly ventilated rooms by adults, releasing hydrocarbons, dioxins, and furans. The significant amounts of plastics that are not recyclable are dumped in streams, rivers, streets, etc.[102]

BAN went on to take some soil samples around some of the processing areas. Soil samples indicated 'alarming levels of heavy metals that correspond directly to the metals most commonly found in computers'[103]. Lead levels in water were 190 times the World Health Organizations Drinking Water Guidelines and sediment samples revealed 212 times the lead that was contained in the hazardous waste dredged from the bottom of the Rhine River in the Netherlands[104].

The BAN also indicated similar situations in India and Pakistan[105]. No doubt, hundreds of comparable situations occur in areas of the world that are poor, undereducated, hungry, and desperate for the chance to earn money. These people are either ignorant to the dangers they are exposed to through their occupation, or are desperate enough to be willing to take the risk. These are examples of international environmental justice. The legal implications, difficulties, and methods of addressing international environmental justice are beyond the scope of this chapter. However, one must recognize that the United States is producing the bulk of e-waste in many of these communities and is unconscionably doing the least to curtail the problem by avoiding the Basel Convention. The BAN document also accuses the U.S. of further contributing to the problem by 1) not mandating that manufacturers eliminate hazardous materials from their products, 2) failing to hold manufacturers responsible for the end-life stage of their products and 3) not having reliable recycling programs in place for electronic waste[106].

Another example of international environmental justice is Texaco's oil production in the Ecuadorian rainforest. In 1964, the Texaco Petroleum Company was invited by the Ecuadorian government to search for and produce oil in a historically oil-rich region of

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[102] IBID, BAN – Exporting Harm, p.17-22
[103] IBID, BAN – Exporting Harm, p.22
[104] IBID, BAN – Exporting Harm, p.22
[105] IBID, BAN – Exporting Harm, p.23-26
[106] IBID, BAN – Exporting Harm, p.1

the Amazon Rainforest. Texaco subsequently designed wells, built pipelines, and operated and managed the state-run Petroecuador oil company. The Ecuadorian government was to own a majority of Petroecudor, while Texaco owned a minority share (until 1992 when Texaco ownership would be phased out). This agreement was sought by the government in order to take advantage of Texaco's experience in the oil industry through extraction, infrastructure, transportation and delivery to the end user.

Texaco proceeded to extract oil from the rainforest region, but decided to dispose of byproducts through unsound methods. Texaco dumped hazardous byproducts into over 300 unlined pits dug into the ground: in the U.S. these toxic materials are re-injected into the ground to avoid contact with the environment. When the pits would fill up, Texaco emptied them into nearby streams and rivers. Material remaining in the pits was left to slowly leach into the groundwater. It is estimated that these pits contribute 4.3 million gallons of chemically laced water into Amazon tributaries every day[107]. The unsafe practice of dumping toxic material into the environment saved Texaco over $5 billion in costs. Additionally, Texaco would burn excess crude oil and contaminated wastewater, which resulted in 'black rain', as well as spread oil and waste on the dirt roads to control dust. Some of the chemicals released with the wastes dumped by Texaco include benzene, toluene, xylenes and polycyclic aromatic hydrocarbons (PAHs)

As a result of Texaco's indiscretions over 30,000 people in Ecuador have contracted skin and intestinal diseases, miscarriages have increased, birth defects have increased, and many have developed cancers[108]. Ecuadorians accuse Texaco of releasing more than 75 million cubic meters of toxic liquid waste into rivers and marshlands, accidentally spilling 60,000 cubic meters of oil, and leaving over 600 dumps containing toxic materials[109]. According to texacorainforest.org the damage from Texaco has resulted in 1) the migration and reduction of the Cofan tribe from 15,000 in 1971 to only a few hundred today, and 2) dramatic reduction in the number of people in the Secoya and Siona tribes[110]. These native tribes are dependent on the contaminated rivers and tributaries for food and water, as a result they have developed various illnesses. A study found that 92% of the 207 waste pits tested are still contributing pollution into the environment, soil and drinking water wells are contaminated with petroleum and all of the more than 1,000 families living near the pits report either health issues, dead animals or bad-tasting water[111]. The pipeline that Texaco built had ruptured 27 times by 1989, spilling 16.8 million gallons of crude, by comparison the Exxon Valdez spilled about 10.8 million gallons[112].

There have been numerous lawsuits associated with Texaco operations in Ecuador. Texaco was acquired by Chevron in 2001, and is now referred to as ChevronTexaco. A 1993 class-action lawsuit brought against ChevronTexaco by a group of Ecuadorian people representing 30,000 other affected individuals has bounced around

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[107] Talbot D, "Rain Forest Pays the Price of Oil Suit Claims Texaco Polluted Ecuador", Boston Herald, August 29th 1999, News Section

[108] Gualinga CV, "The Oil Flows, and the Forest Bleeds", UNESCO Courier, Vol. 52, Issue 4, April 1999, p.12-13

[109] IBID, Gualinga

[110] TexacoRainforest.Org – "After the Gold Rush – The People", located at http://www.texacorainforest.org/thepeople.htm accessed on April 28, 2006

[111] Miller TC, "ChevronTexaco Pollution Trail Begins", LA Times, October 23rd 2003

[112] Gerlach A, *Indians, Oil, and Politics: A Recent History of Ecuador*, SR Books, 2003, pg. 57

in U.S. courts for over a decade. In 2003, U.S. Court decided that the trial should take place in Ecuador and that the U.S. would enforce the decision reached in the Ecuadorian court. The estimated cost to cleanup the damage in Ecuador is about $6-$10 billion[113]. ChevronTexaco denies blame for any adverse health effects, believing that deteriorating health in the region is due to poor sanitation, pesticide use and pollution that has occurred after Texaco operations had ceased. They maintain that they used waste disposal methods that were common practice at the time. Texaco points out that they were only minority owners of the Petroecuador at the time of the damage and that Ecuadorian officials had final say in all the operations. They believe that the $40 million remediation program, mandated by the government and completed in 1998, to clean up polluted sites was enough to rectify any damages done[114]. Ecuadorians accuse Texaco executives of performing environmentally degrading practices that would not be legal in the U.S. in order to save $1 to $3 per barrel of oil, while reaping a profit of over $30 billion from Ecuadorian operations over a three-decade period[115].

While the lawsuit is waiting to be heard in Ecuadorian court, ChevronTexaco shareholders are outraged and demanding action. In an April 2006 shareholder meeting, two resolutions were voted on regarding the Ecuador situation. The first resolution demanded itemized accounts of Chevron's spending on lawyers, lobbyists and PR experts from 1993 to 2005 as part of their campaign to willfully refuse accepting responsibility for the disaster in Ecuador. This resolution received only 9% support[116]. The second resolution called for Chevron to adopt a comprehensive, transparent and verifiable human rights policy by October of 2006, one that specifically cites the Ecuador disaster. This resolution received 25% support[117]. On a related note, in February of 2006 U.S. Senators Patrick Leahy and Barack Obama wrote to the U.S. Trade Representative, Robert Portman, to ignore Chevron's campaign to exclude Ecuador from Free Trade Agreement negotiations until the Ecuadorian government drops the class-action lawsuit[118]. Amazon Watch has also filed a formal complaint with the Securities and Exchange Commission (SEC), alleging that Chevron has committed fraud by hiding multi-billion dollar liabilities related to Ecuador, from shareholders.

Environmental Rights and Environmental Justice

The environmental justice movement is relatively absent of established means of legal redress. Title VI of the Civil Rights Act of 1964 was the legal tool initially used to pursue environmental justice cases that involved the disparate location of environmental

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[113] Ceasar M, "Indigenous Lawyer Targets Texaco", Miami Herald, April 19th 2006, International Section, available online at http://www.miami.com/mld/miamiherald/business/international/14372943.htm accessed on April 28, 2006

[114] IBID, Ceasar

[115] ChevronToxico.com – "Chevron CEO O'Reilly Blasted by Amazon Residents and Scientist Over Ecuador Disaster", April 26th 2006, located at http://www.chevrontoxico.com/article.php?id=318 accessed on April 28, 2006

[116] IBID, ChevronToxico.com

[117] IBID, ChevronToxico.com

[118] PRNewswire.com – "Two U.S. Senators Express Concern Over Chevron Lobbying Tactics in Nation's Capitol Reports Amazon Watch", located http://www.prnewswire.com/cgi-bin/stories.pl?ACCT=104&STORY=/www/story/02-14-2006/0004281736&EDATE= accessed on April 28, 2006

harms in minority communities. Title VI included section 601, which prohibits recipients of federal money from subjecting benefactors of their programs to discrimination on the basis of race. Section 602 of Title VI mandates that all federal agencies responsible for administering federal funds must develop and implement regulations that enforce the aims of section 601. In 1973, the EPA created a regulation that prohibited recipients of EPA funds from using "methods of administering its program which have the *effect* of subjecting individuals to discrimination based on race, color, nation of origin, or sex"[119]. This "disparate impact regulation" was created to comply with Section 602 of Title VI of the Civil Rights Act of 1964.

Title VI and the EPA disparate impact regulations showed promise in offering legal redress to victims of environmental justice and harm. However, in a case known as *Alexander v. Sandoval (2001)* the court concluded that there is no private right of action afforded to enforce EPA's disparate impact regulation. This meant that private citizens or groups could not use the EPA regulation in court to fight instances of environmental racism. The method used by litigators was to claim that decisions regarding the siting of polluting facilities have a desperate impact on plaintiffs and have deprived them of federally granted rights secured under the EPA's disparate impact regulation. This attempt also failed in court on the grounds that the EPA's regulation created no enforceable right. The *Sandoval* case effectively eliminated Title VI regulations from being a tool to fight environmental justice.

In an earlier case, *Regents of the University of California v. Bakke (1978)*, the court held that Title VI prohibited only acts of intentional discrimination. In *Cannon v. University of Chicago (1979),* the court held that Title VI created a private right of action. In 1983, *Guardian Association v. Civil Service Commission,* re-addressed the Bakke debate about whether discrimination had to be intentional to allow for Title VI right of action. The court found that Title VI and regulations formed to implement it prohibit the use of federal money in ways that have discriminatory effects. This meant that plaintiffs might not have to prove the intent to discriminate, only the effect of discrimination. Thus Title VI regulations must prohibit not only intentional discriminatory actions, but also those actions that appear to be neutral but in actuality have discriminatory disparate impacts. In 1985, the *Alexander v. Choate* court ruled that intentional acts of discrimination could be enforced privately, while discriminatory effects through unintentional discrimination could be redressed only through agency regulations designed to implement Title VI. So the question remaining was whether private parties could enforce EPA agency regulations for instances of unintentional, discriminatory disparate impacts in court. The 1998 *Chester Residents Concerned for Quality Living v. Seif* case the court originally held that private plaintiffs could have an action under EPA disparate impact regulations, but later dismissed the case as moot and vacated the earlier decision.

Chevron U.S.A. v. Natural Resources Defense Council(1984) did not directly address environmental justice issues, however, its two-step analysis addressed the Title VI argument. The Chevron two-step analysis addresses the issue of federal government agencies authority granted through statues set up by Congress. U.S. Federal courts review statues enacted by Congress to determine their constitutionality and validity. However, the constitution does not specifically address or limit the authority of

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[119] *Fed. Reg. 17,968 (1973), amended by 46 Fed. Reg. 2,306 (1981), amended by 49 Fed. Reg. 1,661 (1984) (codified at 40 C.F.R. § 7.35(b) (2002)*

government agencies. The Chevron two-step analysis first questions whether a statute permits of forbids an agency's interpretation of a statute. It examines the wording of the Congressional statue to find if it is clear and precise or ambiguous and diffuse. If the definition of the Congregational statute is not clear, the second step of the analysis takes place. Step two decides if the agency's interpretation of the Congregational statute is reasonable or permissible. If the agency's interpretation is reasonable, then the court will defer to the agency's reasoning.

David Galalis of the Boston College Environmental Affairs Law Review, examines the effect of the Chevron two-step analysis on environmental justice legal claims after the *Sandoval* case[120]. His findings indicate that a Chevron two-step analysis of Title VI indicates that Congress did not setup a clear intent or scope of Title VI anti-discrimination mandate. Galalis maintains that since the Congressional definition was not clear and the EPA's definition is permissible, that the EPA "disparate impact" regulations do in fact remain a valid federal law, even after *Sandoval*. So according to the Chevron test, the EPA disparate impact regulations that call for only the effect of discrimination, stand as valid. Regarding a private right of action, the Chevron analysis suggests a greater role for agencies in creating implied private rights of action then the Sandoval decision articulated[121]. Gorod suggests that the Sandoval decision may prevent agencies from creating private rights of action, but it does allow them to reach the same end by broadly interpreting the statutory right granted to them by Congressional statute[122].

Using the Title VI statute granted by congress through federal administrative agencies may allow for legal redress of environmental disparate impact cases, thus addressing environmental justice issues. However, these methods are not established and the legal foundation upon which they stand are conceptual and not yet realized. Amending the United States Constitution with an environmental right could grant means of legal redress to victims of environmental justice and racism. If every human was given the right to an environmental suitable to his or her health and well-being, then disparate impacts resulting from intentional or unintentional discrimination could be addressed. This is because it would not be the intent of discrimination, or even the effect of discrimination that would be examined, only the occurrence of an environment that is not suitable for a persons health or well-being. This affords all people a private right of action if their environment is polluted to the extent that it could cause harm, deteriorate health outcomes, or reduce quality of life. An environmental right would greatly broaden means of legal redress for victims of environmental justice. It would end the notion that people have the right to be pollution-free based on their ability to pay. Similarly, it would also end the idea that a healthy environment is a privilege, by asserting that it is an inalienable right. An environmental right would be the most instrumental measure afforded to minority and low-income populations to protect them from free market economics that do not distribute environmental pollution evenly. Classical economic

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[120] Galalis D, "Environmental Justice and Title VI in the Wake of *Alexander v. Sandoval*: Disparate-Impact Regulations Still Valid Under Chevron", located at http://www.bc.edu/schools/law/lawreviews/meta-elements/journals/bcealr/31_1/03_TXT.htm accessed on May 2, 2006

[121] Gorod BJ, "The Sorcerer's Apprentice: Sandoval, Chevron and Agency Power to Define Private Rights of Action", Yale Law Journal, Vol. 113, 2004, p. 939

[122] IBID, Gorod

theory states that markets operating efficiently will shift resources to those uses which consumers are able or willing to pay for. Wealth communities may be more willing or able to pay for clean air and water than low-income communities. So an efficient market will gear expensive environmental protection towards wealthy communities. Low-income and minority communities are left to bear the burden of the pollution due to these free market realities. An environmental right would work as a 'market failure' that would prevent free market economic practices that concentrate pollution in low-income areas. An environmental right would also reduce the need to rely on Executive Order 12898, which is susceptible to manipulation from the executive branch, to ensure environmental justice issues are addressed.

Conclusion

A few complex government risk assessments and reports claim that low-income and minority populations do not suffer greater environmentally related health risks. The bulk of government sponsored and independent data, as well as elementary economic theory, maintain that low-income and minority populations do in fact incur a disparate impact with respect to environmental pollution. Although the federal government has taken steps to address environmental justice, through Executive Order 12898, a law has not been codified to cement the government's commitment to address and remedy the problem. As a result, the executive branch has been able to change the original definition of environmental justice in a manner that arguably reduces protection for low-income and minority populations. Couple this with findings from the EPA's Office of the Inspector General that state that the agency has not successfully integrated environmental justice into its operations or policies. The result is a severe lack of federal leadership and commitment to curtail environmental racism and class-ism.

The case studies explored in this chapter show real world scenarios of environmental justice that are not atypical. Many more instances of environmental justice exist in the United States and the rest of the world. It is fact that pollution flows down the economic hill. Poor communities and nations all over the world stand to be exploited because they need the economic opportunity that polluting operations provide, or they can't afford to move away from the pollution that exists. Similarly, minority communities that have inefficient or underrepresented political clout, low educational attainments levels, have been historically discriminated against, or are excluded from the decision-making process, are also subject to increased environmental risk because of their situational lack of opportunities.

Some believe that the environmental justice movement is one of fear, irrational behavior, paranoia, fundamental ignorance of reality, and is ultimately a power struggle based on faulty science and dishonest claims. Others believe that social perceptions deserve merit even if empirical evidence is inconclusive. However, the most insightful critics argue that the environmental justice movement will not be successful until it integrates empirical evidence with social value systems. This assertion is especially astute because empirical evidence cannot account for the socio-economic effects that occur in conjunction with living near polluting facilities. Examples of this can be the negative effects on local businesses, decreased aesthetic quality of the environment, decrease in property value, negative social stigma associated with living near waste facilities, increased amount of diesel traffic associated with facility deliveries,

psychological effect of living near polluting facilities, etc, all of which are extremely hard to quantify.

The current structure of the legal system in America has not developed a way to successfully address environmental justice issues. There are few if any established ways that private citizens can hold the government responsible for cases of environmental justice. Amending the U.S. Constitution with an environmental right would grant a significant amount of power to all people in the U.S., especially minority and low-income populations that are disproportionately impacted by pollution.

An American Evolution – Global Climate Change Chapter

Christina Simeone

Introduction

Global climate change is an issue that has separated the United States from the majority of the International community. The reason for this separation is that the majority of the world has begun to proactively invest and sacrifice to combat climate change, and the United States (and some other countries), have chosen to keep the status quo. This 'wait-and-see' approach taken by the United States, and some other countries that have followed us, is particularly disturbing to the International community. It is disturbing because the United States is the world's largest emitter of greenhouse gases, which fuel global warming. The United States consumes the most non-renewable energy and pollutes the earth in far greater proportions than any other countries in the world. Naturally, those in the International community who have contributed less to the global climate change problem yet are acting to curtail it, think it is irrational that the United States is not being proactive, rather choosing to delay while more research is conducted.

This chapter will highlight various aspects of climate change including: recent data and projections, uncertainties in science, contributions of human activity, greenhouse gas mechanisms, impacts on ecosystems and agricultural, associated costs, and current methods of coping with climate change. The chapter is intended to present the climate change problem and it's impacts on the United States. Ultimately, it serves to present the issue of climate change as yet another reason for environmental rights in the U.S. Constitution.

Recent Data and Projections on Climate Change

The bulk of data and information regarding climate change has been taken from the 2001 Intergovernmental Panel on Climate Change's (IPCC) Working Group I, Third Assessment Report on Climate Change, Summary for Policymakers. The IPCC is a committee formed by two United Nations Organizations, the United Nations Environmental Programme (UNEP) and the World Meteorological Organization (WMO) to assess information, study, and plan adaptation and mitigation strategies for the climate change problem. The IPCC does not carry out research or monitoring activities. The committee acts a peer review and synthesizer of published scientific and technical literature. The IPCC is funded by the UNEP, WMO, and its own trust fund, which is replenished by contributions from governments. The IPCC, as the largest international effort to study climate change, and is considered by many to be the foremost source of reliable information on the topic. For these reasons, they are referenced heavily.

According to the IPCC the global average surface temperature (the average of near surface air temperature over land, and sea surface temperature) has increased since 1861. Over the 20th century the increase has been 0.6 ±0.2°C, with a great deal of variability observed, namely that the warming occurred in two periods, 1910 to 1945 and

1976 to 2000[1]. The IPCC maintains that it is very likely (90-99% chance) that the 1990s was the warmest decade and 1998 was the warmest year on instrumental record since 1861. Moreover, analyses of the northern hemisphere indicate that the temperature increases in the 20th century are likely (66-90% certain) to have been the largest of any century in the past 1,000 years. Significantly less information is available for the southern hemisphere. On average nighttime daily minimum air temperatures over land increased by about 0.2°C per decade from 1950 to 1993, which has lengthened the freeze-free season in many mid- and high latitude regions. This 0.2°C increase is about twice the rate of increase in daytime daily maximum air temperatures (0.1°C). The increase in sea surface temperature from 1950 to 1993 is about half that of the mean land surface air temperature[2]. Warm episodes of El Nino events have been more frequent, persistent, and intense since the 1970s, when compared to data from the past 100 years[3]. It is also very likely (90-99% chance) that since 1950 there has been a reduction in the frequency of extreme low temperatures with comparatively smaller increases in the frequency of extremely high temperatures[4].

Projections of future temperature changes suggest that global average surface temperature could increase by 1.4 to 5.8°C over the period 1990 to 2100[5]. Furthermore, the projected rate of warming (for the full range of 35 Special Reports on Emission Scenarios models) is, "much larger than the observed changes during the 20th century and is very likely (90-99% chance) to be without precedent during at least the last 10,000 years, based on palaeoclimate data.[6]" Warming will not occur uniformly in all areas of the earth. Models suggest that it is very likely (90-99% chance) that all land areas will warm more rapidly than the global average, particularly in northern latitudes in the cold seasons. Northern regions of North America and northern and central Asia are expected to warm 40% more than the global mean. Other areas like south and southeast Asia in the summer and southern South America in the winter will warm less than the global mean[7].

By contrast the US EPA has more conservative estimates than then IPCC. The US EPA estimates that, "global temperatures are most likely to rise 1°C by the year 2050 and 2°C by the year 2100, that there is a 10 percent chance that temperatures will rise more than 4°C in the next century, and a 90 percent chance that they will rise by at least the 0.6°C warming of the last century."[8]

The hydrologic cycle (evaporation and precipitation cycle) is particularly sensitive to climate change. Snow cover has been shown by satellite data to very likely (90-99% chance) have decreased by 10% since the late 1960s and there has also been a

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[1] Intergovernmental Panel on Climate Change Website - Summary for Policymakers: A Report of Working Group I of the Intergovernmental Panel on Climate Change. Pg. 2 - Located at www.ipcc.ch/pub/spm22-01.pdf - Accessed on Jan 9, 2006
[2] IBID
[3] IBID, p. 5
[4] IBID, p. 5
[5] IBID, p. 13
[6] IBID, p. 13
[7] IBID, p. 13
[8] US EPA Website – Titus & Narayanan, "The Probability of Sea Level Rise" (1995), located at http://yosemite.epa.gov/oar/globalwarming.nsf/content/ResourceCenterPublicationsProbability.html#execsumm - accessed Jan 11, 2006

widespread retreat of mountain glaciers in non-polar region during the 20th century[9]. Northern hemisphere spring and summer sea-ice extent has decreased by 10-15% since the 1950s and it is likely (66-90% certain) that there has been a 40% decline in Artic sea-ice thickness during late summer and early autumn in recent decades[10]. Global average sea level has risen between 0.1 and 0.2 meters during the 20th century, according to tide gauge data[11]. It is very likely (90-99% chance) that precipitation has increased by 0.5 to 1.0% per decade in the 20th century for most mid and high latitudes of the northern hemisphere. In these mid to high latitude areas of the northern hemisphere it is likely (66-90% certain) that over that last half of the 20th century there has been a 2 to 4 % increase in the frequency of heavy precipitation events (large-scale storm activity, thunderstorms, atmospheric moisture, etc). Conversely, It is likely (66-90% certain) that precipitation has decreased in sub-tropical areas of the northern hemisphere in the 20th century by 0.3% per decade[12]. It is also likely (66-90% certain) that there has been a 2% increase in cloud cover in mid to high latitude land areas of the northern hemisphere during the 20th century. Droughts and floods have also become more frequent and intense over the past century. Parts of Asia and Africa have seen an increase in the frequency and intensity of droughts in recent decades.[13]

Computer models of future precipitation and evaporation patterns suggest, over a wide range of scenarios, that global average water vapor concentration and precipitation will increase in the 21st century. Lower latitudes will see regional increases and decreases over land areas, while northern mid and high latitudes and Antarctica (in the winter) are likely (66-90% certain) to see increases. In areas where precipitation increases are expected, larger year-to-year variations in precipitation are very likely (90-99% chance)[14].

Little to no change in the amplitude of El Niño (El Niño is a disruption of the ocean-atmosphere system in the tropical Pacific having important consequences for weather around the globe) events are expected over the next 100 years, but greater extremes in drying and heavy rainfall and increased risks of flood and drought are expected in conjunction with El Nino events[15]. Ocean currents could be affected by global warming, but a compete shutdown of thermohaline circulation (global ocean current circulation) is not expected by 2100. Thermohaline circulation is driven by differences in the density of the sea water, which is controlled by temperature (thermal) and salinity (haline). Snow and ice cover are expected to decrease further, glaciers and ice caps are also expected to retreat. The Antarctic ice sheet is likely (66-90% certain) to gain mass due to precipitation increases, while the Greeenland ice sheet is likely (66-90% certain) to lose mass[16]. Global mean sea level is projected to rise by 0.09 to 0.88 meters from 1990 to 2100, for a range of modeling scenarios. This is widely attributed to thermal expansion and from the melting of glaciers and ice caps[17].

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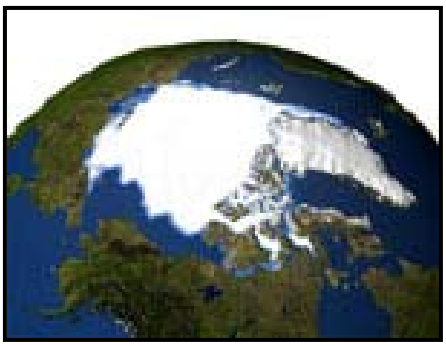
[9] IPCC – WG1, p. 4
[10] IBID, p. 4
[11] IBID, p. 4
[12] IBID, p. 4
[13] IBID, p. 5
[14] IBID, p. 13
[15] IBID, p. 16
[16] IBID, p. 16
[17] IBID, p. 16

On October 23, 2003, NASA released satellite images of the Artic ice sheets in the northern hemisphere. The images show the sheet in 1979 and the shrunken sheet in 2003. To date, 2003 is the second lowest concentration of sea ice on record, with the lowest measurement being recorded in 2002[18]. The images show most of the Artic warmed considerably in the 1990's compared to the previous decade, and that the largest temperature increases have occurred over North America[19].

1979 Artic Ice Cap



2003 Artic Ice Cap

Image courtesy of NASA locates at:
http://www.nasa.gov/centers/goddard/news/topstory/2003/1023esuice.html#addlinfo

NASA conducted studies in 2002 found that year-round sea ice in the Artic is declining at a rate of 9% per decade. Scientists at NASA believe that this loss of sea ice may be directly related to changing atmospheric pressure patterns over the Artic that cause ice to move around, and warming Artic temperatures resulting from greenhouse gas buildup in the atmosphere[20]. A study by NASA senior research scientist, Dr. Josefino Comiso, found that the rate of warming in the Artic over the last 20 years is eight times the rate of warming over the last 100 years[21]. NASA Researcher, Micheal Steele, points out that warming trends could affect ocean processes and increase initial warming trends by creating positive feedback loops. When the oceans warm and ice melts, more solar energy is absorbed by the liquid water, this causes increased water temperatures which causes more ice to melt, impacts ocean circulation and salinity, changes marine habitats, and widens shipping lanes[22]. Also, as once-covered ground and rock begin to emerge from under the melting ice and snow, these surfaces will absorb and retain a great deal of heat. This heat will be stored in the ground and will continue to warm the surface and melt the ice and snow, creating another positive feedback loop.

The IPCC also projects changes in extreme weather event occurrences, these data are summarized below:

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[18] NASA Website – "Recent Warming of Artic May Affect World Climate", Oct 23, 2003 – located at http://www.nasa.gov/centers/goddard/news/topstory/2003/1023esuice.html#addlinfo - accessed on Jan 11, 2006
[19] IBID – NASA Website
[20] IBID – NASA Website
[21] IBID - NASA Website
[22] IBID – NASA Website

Confidence in observed changes (latter half of the 20th century)	Changes in Phenomenon	Confidence in projected changes (during the 21st century)
Likely[7]	**Higher maximum temperatures and more hot days over nearly all land areas**	Very likely[7]
Very likely[7]	**Higher minimum temperatures, fewer cold days and frost days over nearly all land areas**	Very likely[7]
Very likely[7]	**Reduced diurnal temperature range over most land areas**	Very likely[7]
Likely[7], over many areas	**Increase of heat index[12] over land areas**	Very likely[7], over most areas
Likely[7], over many Northern Hemisphere mid- to high latitude land areas	**More intense precipitation events[b]**	Very likely[7], over many areas
Likely[7], in a few areas	**Increased summer continental drying and associated risk of drought**	Likely[7], over most mid-latitude continental interiors. (Lack of consistent projections in other areas)
Not observed in the few analyses available	**Increase in tropical cyclone peak wind intensities[c]**	Likely[7], over some areas
Insufficient data for assessment	**Increase in tropical cyclone mean and peak precipitation intensities[c]**	Likely[7], over some areas

[a] For more details see Chapter 2 (observations) and Chapter 9, 10 (projections).
[b] For other areas, there are either insufficient data or conflicting analyses.
[c] Past and future changes in tropical cyclone location and frequency are uncertain.

Table 1: Estimates of confidence in observed and projected changes in extreme weather and climate events. Table taken from p. 15 of the IPCC Working Group 1, Summary for Policymakers

In 2005, global warming continued to rear its ugly head in the form of recurrent tropical Atlantic storms. This increase in hurricane activity was fueled by a section of deep ocean water in the Gulf of Mexico that was particularly warm, 90°F. This warm layer enabled Hurricane Rita to morph into a Category 5 hurricane, from a Category 2, in less than 24 hours. Hurricane Wilma, when passing over the same warm patch of water, went from a tropical storm to a Category 5 hurricane in a single day. Hurricane Katrina gained similar momentum from this seemingly innocuous section of ocean. MIT climatologist, Kerry Emmanuel suggested that hurricanes have doubled in intensity over the past 30 years as oceans have warmed[23]. The hot areas of the Gulf of Mexico may also be impacting the Amazon rain forest, historically one of the wettest places on the earth, which is currently experiencing an intense drought[24].

In 2005 there were 26 storms named in the hurricane season, which extends from June 1st until the end of November. This is a record-breaking number of storms, with the previous record being 21 storms in 1933[25]. Three of the hurricanes in 2005 reached Category 5 status (speeds greater than 155 mph). According to National Weather Service program manager, Steve Kiser, "We've had two Category 5 storms in several seasons, but we've never had three"[26]. Some climatologists believe that the increase in hurricane number and intensity is due to a 20 to 30 year cycle that alternates between low and high

[23] Linden, E, "Cloudy with a Chance of Chaos", Fortune Magazine, Vol. 153, No.1, January 23, 2006
[24] IBID
[25] CNN Website - Tanneenu, M, "It's Official: 2005 hurricanes blew records away", located at www.cnn.com/2005/WEATHER/11/29/hurricane.season.ender/index.html accessed on January 23, 2006
[26] IBID – CNN Website

intensity seasons. However, there is not enough historical evidence to prove that this cycle exists, because records do not go back far enough in time. CNN meteorologist, Chad Meyers, believes that the proliferation of hurricanes in 2005 is due to the compound effects of the cycle, global warming (warm water fuels tropical storms and ocean temperatures have increased 1-2°F due to global warming) and the lack of an El Niño [27]. The 2005 hurricane seasons illustrates the fact that there is much uncertainty related to the mechanisms of many natural phenomenons.

Climate Change Uncertainties in Science

The legitimacy of climate change has been debated in the past, but as time has gone by the global warming debate has shifted from talks of legitimacy to talks of mechanisms. In other words, climate change is now certain, it is proven to be fact. What is uncertain is the mechanisms by which it operates, inconsistencies in observations, positive feedback loops, affects of oceans, prediction for the future, etc. The Bush Administration, one of the world's leaders most recalcitrant to accept the climate change phenomenon, has brought forth research to Congress indicating that emissions of carbon dioxide and other heat trapping gases are the only likely explanation for global warming over the last three decades[28]. Previously, President Bush and his officials had cited uncertainties in science for rejecting binding restrictions on greenhouse gas emissions. However, even with this 2004 realization of climate change, the Bush administration has done little to curtail GHG emissions or mitigate climate change.

While the climate change phenomenon, and humanity's role in exacerbating the problem, is almost universally accepted, many issues about climate change science are uncertain. The issue of climate change science is controversial because humans imperfectly understand many of the processes and systems that regulate the earth's temperature. Computer modeling is the most utilized tool in predicting climate change behavior. Computer modeling is usually used to; correlate greenhouse gas effects with climate change and estimate the impacts of the effect, and to assess how anthropogenic pollution and behavior will affect greenhouse gases and thus drive climate shifts. Computer modeling has many uncertainties, namely in the modeling of physical phenomena (the compound affects of ocean currents, cloud cover, and other natural phenomenon on the climate system) and the differentiation between natural climate variation and climate variation caused by human activity. Compounding these difficulties, projecting climate models into the future requires estimates of economic performance, land use, future energy consumption, population growth, and technological changes that all affect the anthropogenic component of climate change[29]. These estimates are highly controversial and hotly debated, thus making computer modeling less universally reliable. To correct for the various uncertainties inherent in climate change computer modeling, several different scenarios are typically run on multiple models to try and gain a complete range of possible outcomes.

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[27] IBID – CNN Website

[28] New York Times, Andrew Revkin " U.S. Report in Shift, turns focus to Greenhouse Gases", August 26, 2004, Section A, Column 3: National Desk, pg. 18

[29] Reinhardt & McGrath, "Global Climate Change After Marrakech (A) – Appendix 1: Computer Modeling", Harvard Business School, 9-702-075, Rev. Oct 16, 2002

Since consensus in monitoring, identifying, and understanding climate change science has not been reached, resisting or rejecting the climate change issue has been taboo, but rationalized. To further illustrate some of the difficulties of monitoring and understanding climate change, consider the disparity between weather balloon observations of surface temperatures and satellite measurements of the lowest 8 kilometers of the atmosphere. Since the late 1950s, when adequate weather balloon observations became available, overall global temperature increases in the lowest 8 Km of the atmosphere, and in the average surface temperature have been similar at 0.1 °C per decade. In 1979, satellite records became available. Satellite data shows that the global average temperature of the lowest 8 Km of the atmosphere has changed +0.05±0.10°C per decade, but the average surface temperature has increased significantly by +0.15±0.05°C per decade[30]. The difference is most notably observed over tropic and sub-tropic areas. It is not fully understood why the lowest 8 Km of the atmosphere and the surface display different temperatures, however factors like stratospheric ozone depletion, aerosols, and El Nino phenomenon affect these areas differently[31]. This discrepancy in temperature monitoring is one of many difficulties scientists face in understanding the earth's climate regulation system. However, according to the Panel on Reconciling Temperature Observations, sponsored by the National Research Council, "…the warming trend in global-mean surface temperature observations during the past 20 years is undoubtedly real and is substantially greater than the average rate of warming during the twentieth century. The disparity between surface and upper air trends in no way invalidates the conclusion that surface temperature has been rising."[32]

To illustrate the uncertainties in science, consider an alternative global warming scenario offered by NASA researcher, James Hansen. His team challenges the commonplace belief that global warming will increase or accelerate in the future. The line of reasoning is as follows; the rapid increase in global warming of the past few decades has been driven by non-CO_2 greenhouse gases (GHGs), since the growth rate of non-CO_2 GHGs has declined in the past decade, further warming will not occur if these decreased levels are maintained and CO_2 and black carbon soot aerosol levels do not increase[33]. Hansen confirms the global warming phenomenon, but disagrees with the projections of the IPCC and maintains that global warming is easier to curtail or reverse than most of the scientific community believes.

Hansens's study maintains that climate forcing by CO_2 is the largest (positive) forcing, but that other substances are more than statistically significant. A negative radiative forcing effect works to cool the planet, while positive radiative forcing effect (as exhibited by greenhouse gases, aerosols, and tropospheric ozone) acts to warm the planet. He mentions that the growth rate of forcing by CO_2 doubled between the 1950s and 1970s, but has been flat from the 1970s until the 1990s, despite a 30% increase in fossil

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[30] Intergovernmental Panel on Climate Change Website - Summary for Policymakers: A Report of Working Group I of the Intergovernmental Panel on Climate Change. Pg. 4 - Located at www.ipcc.ch/pub/spm22-01.pdf - Accessed on Jan 9, 2006

[31] IBID

[32] National Research Council's Panel on Reconciling Temperature Observations, Reconciling Observations of Global Temperature Change, ISBN 0-309-59400-6, (2000) located for free at www.nap.edu/catalog/9755.html - accessed on Jan 9, 2006

[33] Hansen et al, "Global Warming in the twenty first century: An alternative scenario", Proceedings of the National Academy of Sciences, Vol. 97, No. 18, August 29, 2000, p. 9875

fuel use[34]. In 1998 the largest annual CO_2 increase occurred (2.7 ppm), then dropping slightly in 1999 (2.1 ppm) and decreased to 1.3 ppm by the end of that year[35]. He asserts that processes producing the non-CO_2 GHGs (chlorofluorocarbons, CH_4, N_2O) have been the primary driver for climate change in the past century, citing that climate forcing by non-CO_2 GHGs (1.4 W/m^2) is almost equal to all forcings for the period 1850-2000 (1.6 W/m^2)[36]. He goes on to mention two observations that back up his data, the observed global warming trends of the past decade and observed heat storage in the ocean[37], but a detailed analysis of his methods and calculations are beyond the scope of this paper.

Hansen believes that the current CO_2 reduction approaches to global warming will not be effective alone, because CO_2 concentrations are not the main factor driving current global warming trends. He suggests that reducing non-CO_2 GHGs and black carbon soot aerosols (from fossil fuel and coal) will be the most effective way to limit global warming. He goes on to note that investments in improved energy efficiency and developing non-fossil energy sources are also important to slow the growth of CO_2 emissions. By focusing on air pollutants like trophospheric ozone and black carbon soot aerosols, global warming could be reduced and the negative human health impacts and poor air quality aspects of these substances could be avoided. Hansen goes on to state that the near term reduction of CO_2 growth to 75ppm in the next 50 years could be reached if current energy efficient technologies are implemented[38]. However, he states that governments need to remove the barriers that discourage the purchasing of energy efficient technology so that such technologies are bought for economic self-interest[39]. The crux of his study suggests that because CO_2 forcings are not driving current global warming and growth rates of non-CO_2 GHGs (that are driving current global warming) have been declining, as long as CO_2 emissions are reduced, black soot aerosol emissions decrease, and non-CO_2 GHGs growth rates continue to decrease, a decline in the rate of global warming could result. This is far more optimistic view about global warming and the ability to curtail the phenomenon than the rest of the scientific community subscribes to.

An evolving belief in the scientific community, since the 1990s, is that climate change may be less like a gradual dial and more like a switch that gets turned on and off[40]. Temperature changes can happen over decades and not centuries, in short flicker periods of intense transition. These flickers can be marked by fluctuations in temperatures of more than 18°F in just a few years, with variations in wind speeds and precipitation. This is particularly problematic because most models of environmental and cost impacts are based on gradual climate change. If climate change is happening more quickly than expected it could have dire implications for damages and associated costs.

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[34] IBID, p. 9877
[35] IBID, p. 9877
[36] IBID, p. 9876
[37] IBID, p. 9876
[38] IBID, p. 9878
[39] IBID, p. 9878
[40] Linden, E, "Cloudy with a Chance of Chaos", Fortune Magazine, Vol. 153, No.1, January 23, 2006

Climate Change and Human Activity

Climate change can result from the earth's internal temperature system variability, or external factors like anthropogenic activity or proximity of the planet to the sun. Forces that have a cooling affect on the planet are called negative radiative forcing, while those that warm the planet are called positive radiative forcing. These measures are expressed in Watts per square meter (Wm^{-2}). Negative radiative forcing comes from sources like stratospheric ozone, volcanic events, sulphate, the albedo effect, biomass burning, and the indirect effect of many aerosols. Positive radiative forcing comes from sources such as CO2, methane, nitrous oxide, halocarbons, tropospheric ozone, mineral dust, and black soot aerosols. Anthropogenic aerosols are tiny particles that are the major components of smog and haze. These are usually short-lived in the atmosphere compared to carbon dioxide. Major sources of anthropogenic aerosols are through fossil fuel and biomass burning. While aerosols tend to cool the earth's climate they degrade air quality and contribute to acid rain and deposition. Natural forces of climate change like variability of the earth's position relative to the sun and the affect of volcanic events have shown to be a negative radiative forcings for the past two and possibly even four decades[41].

The Second Assessment Report of the IPCC concluded, "The balance of evidence suggests a discernable human influence on global climate"[42]. Data suggest that the warming over the past 100 years is very unlikely (1-10% chance) to be due to internal variability alone. Simulations suggest that natural forcings may have contributed to the warming of the first half of the 20th century, but they alone do not explain the warming in the second half of the century. The IPCC states that, "…most of the observed warming over the last 50 years is likely (66-90% certain) to have been due to the increase in greenhouse gas concentrations"[43]. They go on to state that it is very likely (90-99% chance) the warming in the 20th century has contributed to the observed rise in sea level, and widespread loss of land ice[44].

Climate Change and Greenhouse Gases

The greenhouse effect is a natural phenomenon that allows the sun's short wave radiation to enter the earth's system and traps the longer wave radiation (that bounces off of the earth) that would otherwise head back out into space. The buildup of greenhouse gases in the atmosphere is what traps the sun's longer wave radiation. This warms the lower atmosphere and allows for life on this planet. The 'greenhouse effect' is a natural and beneficial process, as it regulates the temperature of the planet. Without it, the temperature of the earth would be about zero°F (-18°C) instead of the current 57° F (14°C)[45].

There are many greenhouse gases that exist naturally in the atmosphere, water vapor being the most abundant, followed by carbon dioxide and other trace gases like

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[41] Intergovernmental Panel on Climate Change Website - Summary for Policymakers: A Report of Working Group I of the Intergovernmental Panel on Climate Change. Pg. 9 - Located at www.ipcc.ch/pub/spm22-01.pdf - Accessed on Jan 9, 2006

[42] IBID, p. 10

[43] IBID

[44] IBID

[45] National Oceanic and Atmospheric Administration Website – Global Warming FAQ, located at http://www.ncdc.noaa.gov/oa/climate/globalwarming.html accessed on January 9, 2006

methane and nitrous oxide. There are also man-made gases that function as greenhouse gases, such as chlorofluorocarbons (CFCs), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs) and sulfur hexafluoride (SF_6). There are other greenhouse gases like tropospheric ozone, which occurs naturally in the stratosphere (as the protective ozone layer) and occasionally fall into the troposphere. Trophospheric ozone, which can also be created by anthropogenic sources, levels have dramatically increased. Lastly, Carbon monoxide and other reactive gases (volatile organic compounds) from anthropogenic pollution are not direct greenhouse gases, but they facilitate the formation of other greenhouse gases (methane, tropospheric ozone) in the atmosphere.

Human activity has been increasing the concentration of greenhouse gases in the atmosphere, according to the National Oceanic and Atmospheric Administration, and "There is no scientific debate on this point"[46]. Carbon dioxide from coal, oil, and gas combustion, has displayed the biggest increase in concentrations. Atmospheric concentrations of CO_2 have increased by 31% since 1750 and the current CO_2 concentration has not been exceeded during the past 420,000 years[47]. The Intergovernmental Panel on Climate Change also stated in a 2001 report that it is likely (66-90% chance) that the current atmospheric concentrations of CO_2 have not been exceeded in the past 20 million years and that the current rate of increase has been unprecedented in at least the past 20,000 years[48]. Three quarters of the anthropogenic emissions of CO_2 into the atmosphere during the past 20 years have been due to fossil fuel burning, the remainder is due to land use change, especially deforestation[49].

In general, the natural carbon cycle of the earth stores carbon in a variety of 'sinks'. Carbon is stored 1) as organic molecules in living and dead organisms in the biosphere, 2) as carbon dioxide in the atmosphere, 3) as organic matter in soils, 4) in sedimentary rock and fossil fuel deposits of the lithosphere, and 5) in dissolved atmospheric carbon dioxide and calcium carbonate shells of marine organisms in the ocean. Currently, the ocean and land together take up about 50% of the anthropogenic CO_2 emissions[50]. The rate of increase of atmospheric CO_2 concentration has been about 1.5 ppm[9] (0.4%) per year over the past two decades, varying slightly in the 1990's from 0.9 ppm (0.2%) to 2.8 ppm (0.8 %) due to climate variability on CO_2 uptake from land and oceans[51]. However, as CO_2 concentrations increase in the atmosphere, ocean and land will be able to take up a reduced percent of CO_2 emissions, thus increasing future atmospheric concentrations of CO_2[52]. Carbon cycle projections suggest that by 2100 the total range of atmospheric CO_2 concentrations will be 490 to 1260 ppm (75 to 350% above the 1750 concentration)[53]. For reference, restoring the liberated CO_2 from deforestation, resulting from historical land use, could reduce CO_2 concentrations by 40

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[46] IBID
[47] Intergovernmental Panel on Climate Change Website - Summary for Policymakers: A Report of Working Group I of the Intergovernmental Panel on Climate Change. Pg. 7 - Located at www.ipcc.ch/pub/spm22-01.pdf - Accessed on Jan 9, 2006
[48] IBID, p. 7
[49] IBID, p. 7
[50] IBID, p. 7
[51] IBID, p. 7
[52] IBID, p. 12
[53] IBID, p. 12

to 70 ppm[54]. Carbon cycle models indicate that in order to stabilize atmospheric CO_2 at 450, 650, or 1,000 ppm, anthropogenic CO_2 emissions would have to be reduced to 1990 levels within a few decades, a century, or about two centuries, respectively[55].

Atmospheric methane (CH_4) concentrations have increased by 1060 ppb (151%) since 1750 and continue to increase, with current levels not being exceeded in the past 420,000 years[56]. Methane is emitted from natural processes, such as the decomposition of organic matter. Methane concentration growth slowed in the 1990s, compared to the 1980s, with more than half of methane emissions coming from anthropogenic sources like fossil fuel burning, cattle & rice agriculture and landfills[57]. Carbon monoxide and its reaction with hydroxyl radicals (OH), has contributed to the increased concentration of methane. Projections suggest that by 2100 CH_4 concentrations could be –190 to +1,970 ppb from the current concentrations at 1,760 ppb[58].

Atmospheric concentrations of nitrous oxide (N_2O) have increased by 46 ppb (17%) since 1750 and continue to increase, with current levels not being exceed in at least the past 1,000 years [59]. One third of N_2O emissions are due to anthropogenic sources such as agricultural soils, cattle feed lots and the chemical industry. Projections suggest that N_2O levels could change by +38 to +144 ppb, from present concentrations at 316 ppb[60].

Many synthetic halocarbons ($CFCL_3$, CF_2CL_2) that are both greenhouse gases and ozone depleting gases are increasing at a slower rate or have been decreasing since 1995, due to environmental regulations. However, many of the substitutes for these chemicals (CHF_2CL, CF_3CH_2F) and some other synthetics (PFCs, SF_6) are still greenhouse gases and their levels have been increasing[61]. Observed depletion of Stratospheric ozone (O_3), the protective ozone layer surrounding the earth that filters out the sun's harmful ultraviolet radiation, from 1979 to 2000 has actually caused a negative radiative forcing effect.

Tropospheric ozone, or ground level ozone, is estimated to have increased by 36% since 1750, due primarily to anthropogenic emissions of O_3 forming gases[62]. These concentrations vary considerably, since O_3 is relatively short-lived and does not mix well in the atmosphere. High concentrations are usually clustered near Northern hemisphere urban areas and the 30?N and 50?N industrial/urban band during spring and summer months. The IPCC considers tropospheric ozone to be the third most important greenhouse gas after carbon dioxide and methane[63]. Tropospheric ozone could change by –12 to +62 according to 2100 projections[64]. Some scenarios suggest that Tropospheric

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[54] IBID, P. 12
[55] IBID, p. 12
[56] IBID, p. 7
[57] IBID, p. 7
[58] IBID, p. 12
[59] IBID, p. 7
[60] IBID, p. 12
[61] IBID, p. 7
[62] IBID, p. 7
[63] NOAA Website – Greenhouse Gases FAQ, located at http://www.ncdc.noaa.gov/oa/climate/gases.html - accessed on Jan 9, 2006
[64] OpCit, p. 12

ozone could become as important a radiative force as methane over much of the Northern hemisphere, and would severely reduce air quality[65].

Climate change due to anthropogenic sources is expected to persist for many centuries. Greenhouse gases can live in the atmosphere for a long time, exerting their positive radiative forcings long after they have been originally emitted. Once greenhouse gas concentrations have stabilized, average surface temperatures will rise by only a few tenths of a degree per century, as opposed to the several degrees per century increase that is estimated for the 21st century[66]. Global mean surface temperatures and rising sea levels are expected to continue for hundreds of years after the greenhouse gas levels have stabilized. Sea levels will rise and ice sheets will continue to melt for thousands of years after the climate has stabilized[67].

Climate Change, Ecosystems, & Agriculture

No one and no thing can escape the affects of climate change. Some effects will be borne directly by Americans through loss of property from coastal flooding or increased prevalence of disease, other effects will be felt indirectly by Americans through decreased agricultural production and higher produce prices. Still other effects will be borne by animals and plants that will have a decreased ability to cope with climate change. A brief discussion of the effects that global warming has on animals, plants, and the land of America is important to understand the breadth and severity of the worldwide phenomenon. A complete examination of ecological impacts is beyond the scope of this chapter, but a brief examination of major trends is warranted. Ecological impacts of global warming have been felt in the phenology, range and distribution of species, composition communities, structure and dynamics of ecosystems, and biological diversity.

Climate change has affected the phenology- the timing of seasonal activities of animals and plants-of organisms in America. These changes cannot be qualified as absolutely negative or positive, still they exist. For example, studies of Europe and North America birds, butterflies, amphibians, and flowering plants suggest that spring activities have been occurring progressively earlier since the 1960s[68]. While some negative impacts do occur in connection with this earlier spring, illustrating all of them and proving causal relationships is beyond the scope of this paper. However, agriculture and wild flora may be negatively affected by this earlier spring because there is an increased risk for damage by a late frost associated with this shift[69].

Global warming causes climate patterns to change. Shifting of "climatic envelopes"- areas that are suitable for certain organism to thrive in - towards the poles or higher altitudes is a result of global warming[70]. Organisms must follow these climate envelopes because they are sensitive to threshold levels of temperature and precipitation. As climate patterns shift, areas where animals and plants once thrived may or may no longer be suitable. This causes mobile organisms to migrate, however, human

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[65] IBID, p.12
[66] IBID, p. 17
[67] IBID, p. 17
[68] Walther et al, "Ecological responses to recent climate change", Nature, Vol. 416, March 28, 2002, p. 389
[69] IBID, p. 390
[70] IBID, p. 390

development patterns may prevent animal and plant migration as many natural features of the land have been replaced by buildings, roadways, or other features, which prevent organism migration. "Poleward and upward shifts of species ranges have occurred across a wide range of taxonomic groups and geographic locations during the twentieth century.", with most shifts occurring in episodic spurts rather than gradual shifts[71]. These distribution changes have been noticed in asymmetrical patterns with species invading in lower elevations or latitudes faster than resident species are receding upslope or poleward[72].

Invasive plant species are more likely to occur and flourish as a result of climate change and shifting climate patterns. This is because existing plants are trying to adapt to new environmental conditions, which may decrease their growth or reproduction rates. This leaves the possibility of new or existing invasive species to crowd out weakened native species if the new climate conditions are more favorable to the invasives. Also, evidence suggests that carbon dioxide promotes the growth of invasive weeds far more than it stimulates crops, thus reducing the nutritional value of rangeland grasses (which are important for livestock feed)[73]. In another study increased CO2 stimulated the growth of five of the most important species of invasive weeds, more than any other plant species yet studied. This suggests that some weeds could become major problems as CO2 concentrations increase, causing trouble for farmers and perhaps even pushing out needed agriculture for livestock or human use[74]. An example of biological changes directly related to global warming is the proliferation of macroscopic mosses on newly exposed ground and rock in the Antarctic.

Effects on agriculture are uncertain. Longer growing seasons in the colder areas, heat stress the South, increased evaporation and precipitation rates, and susceptibility to pests will decrease the productivity of the land and decrease crop yields. However, the IPCC predicts that North American food production will benefit from a warmer climate, though the comparative advantage will be lost in many regions to other countries with newly enabled agricultural capacity[75]. The IPCC also predicts increased droughts in the Great Plains and suggests that the ability of farmers to cope with climate change will depend on governmental direction and market signals[76]. The EPA suggests that climate change could extend deserts into existing rangeland, alter forests and crops yields, and permanently change characteristics of many National Parks[77]. The ideal range for forests could shift 300 km (200 miles) to the North, however, the pace of climate change, soil quality, and method of tree reproduction affect the ability of forests to migrate[78].

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[71] IBID, p. 391
[72] IBID, p. 391
[73] New York Times, Andrew Revkin " U.S. Report in Shift, turns focus to Greenhouse Gases", August 26, 2004, Section A, Column 3: National Desk, pg. 18
[74] IBID, NY Times
[75] IPCC Working Group II: Impacts, Adaptation and Vulnerability – Chapter 15: North America located at http://www.grida.no/climate/ipcc_tar/wg2/547.htm#7 accessed on January 25, 2006
[76] IBID – IPCC WG II
[77] EPA Website – Climate Change Impacts located at http://yosemite.epa.gov/oar/globalwarming.nsf/content/impacts.html accessed on January 25, 2006
[78] EPA Website – Climate Change Impacts on Forests located at http://yosemite.epa.gov/OAR/globalwarming.nsf/content/ImpactsForests.html accessed on January 25, 2006

Rising sea levels will flood wetlands, destroy beaches, decrease dry land area, affect dike construction, and increase government costs, as infrastructure will be forced to move to higher elevations. Water resources will become scarcer as rising temperatures, increased evaporation, and reduced rainfall will increase the demand for irrigation water and diminish the overall water supply for all uses. A study by Tim Barnett at the Scripps Oceanographic Institute found that even modest decreases in rainfall in the Los Angeles area during a best-case scenario for future climate change (gradual and small change in climate, decades in the future) would cause a 50% reduction in available water for the area by 2050[79]. This is because the Los Angeles area relies on winter snowpack accumulation on top of the Sierra Nevada and Rocky Mountains for water. Warmer temperatures will reduce snowpack accumulation in the winter and lead to summer water shortages. Remember that this 50% reduction in water availability is the best-case scenario, swifter climate change would bring more drastic reductions. Hydropower production and water quality in the area are also expected to decrease as water levels drop, thus increasing pollution concentrations.

Costs of Climate Change

Predicting the costs of climate change can help policy makers understand how to balance present mitigation costs with future climate change reduction benefits. A policy maker must consider if diverting financial resources from one sector (say education, defense spending, administrative costs, public welfare programs, etc) will create a larger social benefit in a new sector (say mitigating global warming) than keeping the monetary resources in their original place. If the future social benefits of reduced climate change are greater than the current social costs of poorer education outcomes from reduced domestic education investments, or domestic susceptibility to foreign invaders through reduced defensive spending, than the policy maker will chose to invest in the new program. If the future benefits do not outweigh the current costs, than the new program will not be implemented.

The Unfunded Mandates Reform Act of 1995, passed by the 104th Congress required agencies, excluding independent regulatory agencies, to prepare cost-benefit analysis (CBA) for any regulation likely to result in costs of $100 million or more per year. CBAs must consider reasonable alternatives and select the least costly, most efficient (or least burdensome of the alternatives) or explain why such alternatives were not selected[80]. In 2000, the Treasury and General Government Appropriations Act made requirements of the Office of Management and Budget to issue guidelines to standardize measures of costs and benefits, such as the discount rate. In light of these regulations, and in the absence of an environmental right or independent environmental regulatory agency, any plan to mitigate climate change expected to cost the federal government more than $100 million, must be subject to a CBA. CBAs often must compare costs incurred today to implement a program to benefits received at some time in the future as a result of the program. In order to do this a discount rate is used to find the present value of future benefits. The discount rate is a reflection of the fact that, in general, most

[79] Linden, E, "Cloudy with a Chance of Chaos", Fortune Magazine, Vol. 153, No.1, January 23, 2006
[80] Boardman, Greenberg, Vining & Weimer, Cost-Benefit Analysis: Concepts and Practices"2nd Edition, Prentice Hall, New Jersey, 2001 p. 5

people prefer a dollar of consumption today over the promise of a dollar of consumption tomorrow (or some other time in the future). This propensity for immediate consumption requires an interest rate (discount rate) to be paid in order to make future benefits look more appealing. Therefore, a person might be persuaded to put off $1.00 of consumption today so they can consume $1.07 tomorrow. This discount rate is named as such because people tend to discount the future and value the present more.

There are many problems with the way CBAs handle environmental issues, especially when related to climate change. To be specific, government economists usually assume perfect substitutability between man-made goods and natural capital[81]. This means that if global warming leads to permanent damages to the earth, rendering some services provided by the earth unusable, man-made goods will offer a comparable substitute. CBAs assume that any damage done to the environment is reversible, and that man-made technologies can substitute adequately for such losses. This assumption may hold true in the short term, but long-term global warming trends affecting many natural capital services and could prove this assumption drastically incorrect. If natural capital goods (oil, fresh water, etc) and services (efficient air purification, climate regulation) are depleted or disrupted and no comparable substitutes can be found or created, societal welfare could decrease.

Gerlagh and Van der Zwann suggest two possibilities; that as man-made production continues to grow, the welfare level that can be reached is i) independent from natural capital stock, (perfect substitutability) or ii) dependent on natural capital stock, (poor substitutability)[82]. In the case of perfect substitutability, natural capital stock is not related to increasing societal welfare. This is the assumption that the U.S. government bases its CBAs on. Furthermore the U.S. Global Change Research Program uses this perfect substitutability assumption in its Integrated Assessment Models (IAMs), some of which are used by the IPCC, the global leader in the climate change initiative. Perfect substitutability maintains that man can produce goods to substitute for natural stock. However, this assumption flies in the face of economic theory because natural stock is a public and common good. The characteristics of a public and common good, like natural stock, precludes it from ever being offered in the private market because there would be unlimited access to the good and it does not exhibit consumption scarcity. In short, if natural stock were depleted, substitutes for it (if substitutes were possible to create) would be economically unfeasible to provide. In the poor substitutability case, in the long-term, the natural capital stock is critical for increasing the societal welfare of the nation. Man could not create substitutes for natural stock and shortages and increased competition would ensue. Thus, natural capital shortages become the limiting factor to improving societal welfare when economic growth continues. In light of this flawed assumption it is apparent that the data from IAMs, which the U.S. Government relies on for global climate change research data, may be misleading since they cannot accurately account for substitutability concerns.

Current neo-classical economic thinking, used by the United States, believes that no aggressive climate change abatement measures are necessary because the net present

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[81] Gerlagh & Papyrakis, "Are the economic costs of (non-) stabilizing the atmosphere prohibitive? A comment." Ecological Economics, Vol. 46, 2003, p. 325

[82] Gerlagh and Zwann, " Long term substitutability between environmental and man-made goods", Journal of Environmental Economic Management, Vol. 44, 2002, p. 329-345

value of the emission reductions costs exceed the net present value of the benefits these reductions would bring by preventing damages associated with global warming[83]. If you factor in the issue of substitutability one might argue that if global warming does cause severe damage to the earth and ecosystems, then damage in the past will prevent future consumption. Thus compensation received in the past will be considered insufficient by future generations since economic gains will not yield increases in overall social welfare. Herein lies another problem with CBA, no distinction is made between generations, because it is assumed that future generations would be better off if current generations invested funds today that would yield increased funds in the future. Therefore, current policy makers would not invest $1.00 today to prevent $5.00 worth of environmental damage in the future, because that $1.00 could be invested somewhere else to yield $10.00 of economic gain in the future. Theoretically, assuming perfect substitutability, environmental damage could be corrected for $8.00 in the future, leaving a net societal benefit of $2.00. However, the assumption of perfect substitutability has many shortcomings that could distort the situation with respect to future generations.

Yet an even bigger problem with CBA is that environmental issues and concerns are always undervalued because their value is based on the public's demand curve. The public's demand curve for environmental services is derived from their willingness to pay (WTP) for such services. Since most people would not pay out-of-pocket for environmental services like incremental units of fresh air or to protect the quality of their local stream, government CBAs undervalue the environment and the services it provides. Historically, the services provided by the environment are taken for granted by everyone who enjoys them. People enjoy fresh air, clean water, dry land, etc, without having to pay for it. Humans, for the most part, believe (consciously or unconsciously) it its their birth right to enjoy such services.

Another factor that masks the true costs of global climate change is the fact that many GHG producing products have negative externalities, or negative impacts that are not reflected in the price of goods. For example, when you buy a gallon of gas for $2.50, you are paying for the cost of extraction, processing, distribution, marketing and corporate administrative costs. You plan to use this gas to power a car, which will help you get to work, run errands, visit family, etc. However, fossil fuel combustion degrades that environment by releasing harmful greenhouse gases into the atmosphere. This is a negative externality of gasoline consumption. The $2.50 you paid to buy the gallon of gas does not reflect this damage done to the environment. If these negative externalities were monetized, the price of gasoline would increase, perhaps to $3.00 a gallon. This higher price would accurately reflect the total lifespan and impacts of product you chose to consume. Not accounting for the negative externalities of greenhouse gas use (from fossil fuel burning, CFC use, unmonitored landfills, etc) artificially keeps the price of damaging products low and distorts the true market price of these goods.

For the government to make a decision on whether or not to take action regarding climate change, they must be able to input costs and benefits to their cost benefit analysis. There are no universally agreed upon costs of climate change, because no one knows exactly what damage will occur in the future. However, there are numerous figures published, some of which I highlight. I will begin by showing cost figures estimated in

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[83] Gerlagh & Papyrakis, "Are the economic costs of (non-) stabilizing the atmosphere prohibitive? A comment." Ecological Economics, Vol. 46, 2003, p. 327

1992 for costs of climate change in the United States. James Titus in the Office of Policy Analysis of the U.S. EPA calculated these numbers. This study was chosen because it made two significant changes from traditional cost calculations of climate change. First it focused on the range of uncertainty about climate change, instead of basing calculations on average estimates. This took into consideration that people are risk adverse, uncertainty tends to be skewd, and damage function is often nonlinear. Secondly, this study incorporated environmental and other non-market impacts.

The Titus study estimates that CO_2 doubling from 1992 levels would cost the United States $37-351 billion per year, with $92-130 billion most likely[84]. Annual losses in agriculture could reach $7.45 to 42.2 billion (in 1984 dollars) from longer growing seasons in colder areas, heat stress in the south, increased evaporation, precipitation changes, and changes in pests. Energy requirements could increase since air conditioning use would increase. Air conditioning use is expensive, since it is often used at peak electricity hours during the day. These costs could perhaps be partially offset by less energy use in the winter for heating, but currently (2006) oil tends to be more expensive than electricity. This decreases the ability for relatively more expensive yet decreased heating needs to offset increased air conditioning costs. In 1992 it was estimated that increased electricity needs would cost the US $37 billion with low economic growth and $53-8 billion (1986 dollars) with high growth[85].

Increased health risks from heat and cold related death exacerbated by climate change could result in extra costs to the U.S. A study of 15 urban cities suggests that CO_2 doubling would cause heat-related deaths in 529-3878 elderly and 513-2368 among other age groups, while reducing cold related deaths by 59-123 in the elderly and 25-68 among other age groups. The government estimated value of reducing the risk of a statistical death (in 1992) is between $1.6 and 8.5 million[86]. Using an average value of $5 million dollars for each of the 1042 (the sum of the lowest estimates in each age) lives lost to heat–related deaths, a cost of $5.21 billion. While this number does not include the costs saved by fewer cold-related deaths, it also greatly understates the costs of lives lost because it uses the low end of the death toll estimates and the mid-range of the cost estimates per life saved.

Changes in water supply from fluctuating evaporation and precipitation rates could cost the US between $1 –7 billion depending on which model is used. Water quality problems will be more expensive than water quantity problems, the costs of water pollution control would increase $15-52 billion and total water resource cost would be $21-60 billion[87]. More recent cost estimates paint an even bleaker climate change bottom line. According to the Organization for Economic Cooperation and Development, economic damages from climate destabilization could cost the global economy $970 billion[88].

While this chapter focuses on the impacts of climate change to the Untied States, it is important to understand how the U.S. will be affected by climate changes damages in

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[84] Titus, James, "The costs of climate change to the united states", Global Climate Change: Implications, Challenges and Mitigation Measures, Pennsylvania Academy of Sciences. Chapter 27, p.1
[85] IBID, p. 2
[86] IBID, p. 4
[87] IBID, p. 8
[88] Henderson, EGC, "The economic costs of climate change", The Ecologist, March 1, 1999

foreign areas. Foreign markets, especially in developing countries who are less able to cope with climate change, will be crippled. The cheap foreign labor that fuels 'excess consumption', affording the United States such inexpensive goods and commodities, will disappear as foreign populations will have to mobilize to mitigate damages on their own land. Foreign municipalities will struggle to maintain and repair their costal infrastructure. Production capacities and efficiencies in foreign markets will be lost to climate change. This will increase consumer prices for most market goods as well as increase raw material prices.

On domestic land, we will have similar issues. Increased government expenditures on infrastructure maintenance and repair, and increased demands for FEMA and other emergency services will arise. Property values will fall in most cases, especially around costal areas and waterways. Consider the 500-year floods in the Midwestern U.S. that caused $27 billion in damages in 1993[89] or Hurricane Katrina in 2005 that cause billions in damages. Many of these damages were caused by the compound effect of global warming and the human destruction of many natural features that protect land situated that is near water. Examples of this are the destruction of wetlands and mangrove tree buffers, and the development of commercial and residential properties on natural floodplains. Principle Global Investors released a special report on the economic effects of Hurricane Katrina. Their forecasts estimate a decline in real GDP in the 3rd quarter of 2005 from the original estimate of +6.4% to only a +4.8%growth rate. For 2006, the projected growth rate was reduced from +3.8% to +3.5, all because of one devastating hurricane that affected lives (two months after hurricane Katrina the death toll stood at 1,289[90]), property and energy prices considerably[91]. Further inquiry into the costs of Katrina show a $10.5 billion congressional bill passed for emergency hurricane relief, 150,000 to 500,000 lost jobs in the affected regions, significant rebuilding expenses (which add to GDP), $30 million in privately insurance payouts, a 40% rise in the price of gasoline in the entire U.S., and other miscellaneous costs[92]. Imagine if global warming is a rapid, instead of a gradual phenomenon. Imagine that Category 5 hurricanes become the norm each year as Gulf of Mexico Ocean temperatures continue to rise. The reduced growth rates and negative economic impacts from such events could be much greater.

Financial markets are affected, as investments of any kind will become more risky. Insurance companies are assuming 'catastrophic risk' with many climate change scenarios. As losses from this increased risk mount, insurance companies will be forced to pull back, shifting financial risk to businesses, homeowners, banks, and taxpayers. In Florida, a 40% increase in insurance rates is being observed, making it harder for people to sell their homes[93]. In Cape Cod, Mass there has been a 20% increase in the reinsurance rate (the rate charged by financial institutions to back insurance companies),

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[89] Linden, E, "Cloudy with a Chance of Chaos", Fortune Magazine, Vol. 153, No.1, January 23, 2006

[90] CNN Website - Tanneenu, M, "It's Official: 2005 hurricanes blew records away", located at www.cnn.com/2005/WEATHER/11/29/hurricane.season.ender/index.html accessed on January 23, 2006

[91] Principal Global Investor Website – Special Report: Hurricane Katrina, Spet 2005, located at http://www.principalglobal.com/pdfs/KatrinaSpecRpt.pdf accessed on January 18, 2006

[92] Congressional Budget Office Website - "Macroeconomic and Budgetary Effects f Hurricane Katrina", located at http://www.cbo.gov/ftpdocs/66xx/doc6627/09-06-ImpactKatrina.pdf accessed on January 18, 2006

[93] Linden, E, "Cloudy with a Chance of Chaos", Fortune Magazine, Vol. 153, No.1, January 23, 2006

which caused Hingham Mutual Group to drop property coverage for 6,500 commercial properties. These properties then had to fall back on the state's mandated FAIR (Fair Access to Insurance Requirements) program, run by various insurers. The groundbreaking aspect of this is that the FAIR plan requested large rate increases stating that past weather patterns may no longer be a guide to estimating future climate risks[94]. This is a major trend in the insurance sector that is affecting many aspects of the financial world. If insurance companies can't operate many pension funds will fold, business expenditures will become more risky, property will be harder to sell, economic growth could decrease and societal welfare could decline.

Andrew Dlugolecki, a risk analyst at Britain's Tyndall Center for Climate Change estimated that if gradual climate change occurs, the chances of the insurance industry getting wiped out by weather–related catastrophes would rise from 1 in 100 worldwide to nine in 100 by 2050[95]. In the short term this increased risk could push premiums up to 12%, a number that makes insuring cost-prohibitive to many businesses and individuals. If climate change happens more rapidly, these risk factors and insurance rate premiums could all increase. Coastal areas exhibit the highest rate of risk from weather related catastrophes. Companies owning offshore oil platforms have seen a 400% increase in their insurance rates[96].

Acting on the climate change problem could cost the United States money, however, not acting could be even more costly. Besides the costs associated with catastrophic events, damage to infrastructure, lives lost and other expenditures discussed in this section, the US could further pigeonhole the economy by not acting. Adhering to a fossil fuel economy, when peak oil production is expected in the near future, with subsequent declines in production clashing with increased demands for oil (increasing at 2% per year[97]) is bad policy. Debate over oil supplies is hotly contested and highly controversial. The question seems not to be whether we will run out of oil, rather, when will drilling for oil reserves located in deep in the earth or in remote locations, become too expensive. Many believe that 'peak oil production', from oil sources that are economically feasible to drill, have been reached already. Annual oil discoveries have been declining since 1965 and the Department of Energy (DOE) predicts ' peak oil production' will be reached anywhere from 2016 to 2037[98]. Oxford University PhD geologist, Colin Campbell, suggests, " The maximum peak of production as far as the normal so-called oil has come (in 2005), after which there will be a long decline.[99]" While exploring the debate about oil supplies is not in the scope of this chapter it is important to understand the economic effects of not transitioning to other energy resources. A 2005 DOE analysis indicated that, America risks a 20-year "severe fuels problem" if we delay planning for a post-petroleum energy economy until peak (oil production) is actually reached. Even if America begins a crash program 10 years before peak, the DOE analysis estimates we will still face a decade of hardship.[100]

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[94] IBID, p.3
[95] IBID, p.3
[96] IBID, P. 4
[97] Motavalli, Jim, "The Outlook on Oil", E - The Environmental Magazine, January/February 2006, Vol. XVII, No. 1, Page28
[98] IBID- Montavalli, p. 28
[99] IBID, p. 28
[100] IBID - Montavalli

Coping with Climate Change

The most comprehensive plan to mitigate global warming, the Kyoto Protocol, was introduced by the United Nations through the United Nations Framework Convention on Climate Change (The Convention). The Kyoto Protocol is a legally binding document meant to create real and enforceable punishments for those countries that don't reduce their greenhouse emissions. This aspect of international legal enforcement is what makes the Protocol so unique.

The Kyoto Protocol basically divides countries up into 3 Annex sections (developed, developing - economies in transition, and least developed). Each Annex has certain responsibilities and levels of commitment in accord with their ability to adhere to the Protocol. Annex I parties (U.S is Annex I) that ratify the Protocol are expected to adopt climate change policies to reduce their greenhouse emissions to 1990 levels by a future date. Annex II parties are expected to offer financial assistance to developing countries to help them create emissions reduction activities, transfer environmentally friendly technology, and help them cope with the adverse effects of climate change. Non-Annex I parties are mostly developing and least developed countries. Non-Annex I parties are usually the recipients of aid and technology according to the Kyoto Protocol.

All parties that have ratified, accepted, approved or acceded to the Convention (a precursor to the Protocol, not the Protocol itself) are required to inventory their greenhouse gas emissions, submit reports ('national communications') on actions taken, and prepare 'national programmes ' that follow specific criteria. The Protocol focuses on 5 main rules; commitment to target reductions, implementation of reduction mechanisms, minimizing impacts on developing countries, accounting, reporting and review, and compliance. An innovative aspect of the Protocol is that parties may offset their emissions by developing greenhouse gas removing mechanisms (only mechanisms approved by the Convention) such as carbon sinks, land-use change and increased forestry.

Other innovative mechanisms created by the Protocol are joint implication, clean development mechanism and emissions trading. Joint Implementation allows Annex I countries to start programs in other Annex I countries to reduce emission or increase removal sinks. Such programs would generate Emission Reduction Units (ERUs), which can be used to help reach the emissions goal of the Annex I country who implements the program. Emission trading allows Annex I parties to obtain AAUs (acquired amount units) from other Annex I countries who can reach their emissions targets more easily. This allows for the same overall effect of emissions reduction, while allowing opportunity for cost cutting. However, no country can oversell its credits, everyone must hold a minimum levels of credits at all times.

Clean development mechanisms (CDMs) are used to encourage private sector investment in developing countries to promote sustainable development and facilitate the transfer of environmentally friendly technologies. CDMs allow Annex I parties to invest in projects to reduce emissions in Non-Annex I countries. In return they receive certified emission reduction units (CERs) that can be counted towards the emissions reduction of the Annex I country. The reoccurring theme of Kyoto's various mechanisms is to create cost-cutting strategies and options for Annex I parties, yet still achieve the goal of overall emissions reduction. There are many other facets of the Kyoto Protocol, such as the

emissions accounting and reporting procedures, compliance and review systems, and future goals.

The Kyoto Protocol came into force on February 16, 2005, after Russia ratified the treaty in November 2004 (a key point in fulfilling participation requirements of the treaty). As of September 2005, 156 countries have ratified that agreement (61% of global emissions), with the noteworthy exceptions of the United States and Australia. President Bush failed to ratify the Kyoto protocol for three reasons; 1) it would hurt the U.S. economy, 2) developing countries (who have high GHG emissions), like India and China, are exempt from emission reductions, and 3) it will undermine domestic sovereignty. Other U.S. stakeholders are opposed to Kyoto purely because of negative economic impacts. American labor unions, industry associations, and consumer groups have voiced strong opposition to Kyoto on these grounds. The fear is that there will be a slowdown of economic growth and huge jobs losses resulting from higher energy costs and caps on emissions. While there is no proof that this will happen, it is likely that the fossil fuel dependent American economy would change drastically if it were to ratify the Protocol.

To illustrate the costs associated with climate change we can examine Senate Amendment 2028 to the Climate Stewardship Act, which was sponsored by Senators McCain and Leiberman in 2004. This bill aims to reduce greenhouse gas emissions through a cap and trade system, similar to that of Kyoto. The plan would be separated into two phases, the first beginning in 2010 and aiming to reduce greenhouse gases to 2000 levels, the second phase has been debated but is planning for an 80% reduction in greenhouse emissions from 1990 levels by 2050. In a report prepared by Charles River Associates Inc., the costs of implementing SA 2028 were detailed and discussed. Their data showed that an average household could expect to incur a loss of $600 to $1,300 per year in 2010, rising to $1,000 to $2,300 by 2020. 39,000 to 250,000 jobs would be lost in the U.S. in 2010 and 190,000 to 610,000 jobs would be lost by 2020. They predict that energy producing industries would be hardest hit, except natural gas, with coal production decreasing by 57% to 73%. In non-energy producing sectors, those industries that are most heavily dependent on energy would be hardest hit, namely the steel and chemicals sectors. Overall, production from energy intensive industries would decline by $70 to $160 billion by 2020[101]. To make matters worse the report suspects that the cost burden of SA 2028 will fall mostly on the poorest 20% of U.S. households, which will bear a 64% heavier burden then higher income households. The elderly will face a 15% greater burden then those under the age of 65.[102] Additionally, losses in personal income tax revenue and reductions in gasoline tax collections would lead to a loss of Federal revenue of $7.5 to $18.8 billion in 2010[103]

The Pew Center for Climate Change performed some due diligence on Charles Rivers Associate, Inc analysis of SA2028 and came to some interesting conclusions. They found the CRAs cost estimate were high because they were based on a single assumption of what will happen 50 to 70 years in the future. CRAs lower cost estimates were also flawed because they assumed business-as-usual scenarios where no GHG

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[101] American Council for Capital Formation Website –" Costs to the U.S. under the McCain/Lieberman Proposed legislation to limit Greenhouse Gas Emissions" located at http://www.accf.org/pdf/GHGreports/US-2-page.PDF accessed on January 23, 2006

[102] IBID – ACCF Website

[103] IBID – ACCF Website

reduction would be made 50 to 70 years into the future[104]. This assumption omits new federal emissions standards, energy efficiency programs, GHG reduction programs and climate change programs, voluntary or required. These omissions widen the emissions gap and artificially inflate costs. CRAs estimates were also high because they assumed that if SA 2028 were enacted, congress would not amend the bill for 70 years. This would mean that the U.S. would be bound to the provisions of the bill, even if more efficient technologies were made available. It is common practice for Congress to periodically revise laws; CRAs assumption was incorrect and artificially inflated the costs of SA 2028. CRA goes on to assume that the U.S. would not be innovative enough to widely produce low carbon technologies over the next 70 years (a ridiculous assumption), natural gas supplies would be tight over the next 70 years (an objectionable opinion), the behavior of consumers today is driven by what they believe will happen 70 years from now (an assumption that is contrary to all current government cost benefit analysis), and a slowed growth rate of the economy (which CRA assumes will be made for by increases in personal income tax rates). These factors and more all contribute to CRA's inflated costs of enacting a climate stewardship bill that had similar emission reduction targets as Kyoto.

It is apparent that cost estimates for mitigating climate change are highly controversial. Making any kind of economic projection into the future requires assumptions to be factored in. The assumptions considered affect cost estimates greatly. The person or entity performing the analysis has many ways of manipulating data to reach a desired end result. One can see a pattern of deductive reasoning in the CRA analysis, the end conclusion that SA2028 is not economically feasible was the starting point, and the facts that supported this central claim were arrived at accordingly. Inductive logic would look at the facts first and then arrive at a conclusion. Inherent difficulties in obtaining facts from future projections make an argument concerning analysis relevancy weakened, but still valid.

While SA 2028 is not the same program as the Kyoto Protocol, it's effects are similar on our economy. Many people would prefer SA 2028 to Kyoto because it is a domestic program, which is self imposed and self-controlled. Many people resent foreign organizations having control over domestic issues and are critical of Kyoto because they believe it undermines domestic sovereignty. Moreover, the exclusion of India and China from emissions reductions makes the Kyoto Protocol less compelling. It is as if one burglar is thrown in jail, yet his two participating accomplices are allowed to walk free. Economic impacts of reaching the emissions targets set by Kyoto are estimated to be $400 billion by 2010 for the highest cost scenario (this is the figure the White House Council on Environmental Quality frequently cites) and $7 to $12 billion by 2010 for a lower cost scenario, according to the federal Energy Information Administration[105].

In February 2002 President Bush announced his Clear Skies and Global Climate Change Initiatives. The Clean Skies legislation addresses the problem of cleaning up the air that Americans breath by dramatically reducing power plant emissions of sulfur

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[104] Pew Center for Climate Change Website – "Pew Center Assessment of CRA's Analysis of the Amended (SA2028) Lieberman-McCain Climate Stewardship Act (S139) located at http://www.pewclimate.org/policy_center/analyses/assessmentcra.cfm accessed on January 18, 2006

[105] Linden, E, "Cloudy with a Chance of Chaos", Fortune Magazine, Vol. 153, No.1, January 23, 2006

dioxide, nitrogen oxides and mercury[106]. The Global Climate Change Initiative was created to reaffirm America's commitment to the United Nation's Framework Convention on Climate Change (the organization that sponsored the creation of the Kyoto Protocol) after the U.S.'s rejection of Kyoto. The goals of Bush's initiatives are to reduce the amount of greenhouse gas emissions relative to the size of the domestic economy. Using the 'GHG Intensity' method (ratio of greenhouse gas emissions to economic output expressed in gross domestic product), will in theory, allow for GHG emissions to be slowed and if warranted in the future, reduced. In efficiency terms, the 183 metric tons of emissions per million dollars GDP that we emit today will be lowered to 151 metric tons per million dollars GDP in 2012[107], a number that the Administration cited as being comparable to the reductions that Kyoto participating nations are required to achieve. Bush's plan calls for an 18% reduction in GHG intensity over the next 10 years. A measure that will prevent 500 million metric tons of GHG's, the equivalent of taking 70 million cars off the road, from reaching the atmosphere by 2012 while still allowing for economic growth[108]. He believes that economic growth is what will spur investments into environmentally friendly technologies, increased conservation and energy efficiency.

The Bush administration believes that the Kyoto Protocol will cost the American economy up to $400 billion dollars and 4.9 million jobs[109]. In a direct quote, President Bush explained his administration's view that a sustained economy is the road to a solution to the climate change problem.

> "Addressing global climate change will require a sustained effort over many generations. My approach recognizes that economic growth is the solution, not the problem. Because a nation that grows its economy is a nation that can afford investments and new technologies."[110]

The Bush administration firmly believes that technological advances will be that way to combat human-induced global warming in the future. He maintains that more money has to be funneled into the development of environmentally friendly technologies such as hydrogen fuel cells and hybrid vehicles, as well as other alternative energy sources.

In a strategy to coordinate our nation's efforts on climate change President Bush created the Cabinet Committee on Climate Change Science and Technology Integration. This is an interagency, cabinet-level committee (much like the Office of Homeland Security) co-chaired by the Secretaries of Commerce and Energy. Its task is to organize and prioritize Federal research on climate change science and development of advanced energy technologies, develop policy recommendations, and oversee climate change and technology programs within relative agencies.

When Bush originally proposed his plan in 2002, the budget devoted $4.5 billion to addressing the climate change problem, an amount far exceeding any other nation's contribution[111]. In 2005 the fiscal year's budget proposed $5.8 billion for climate change programs and energy tax incentives. This includes $3 billion for the Climate Change

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[106] White House Website –News and Policy February 2002 http://www.whitehouse.gov/news/releases/2002/02/20020214-5.html accessed on January 24, 2006
[107] White House Website – Global Climate Change Policy Book located at http://www.whitehouse.gov/news/releases/2002/02/climatechange.html accessed on January 24, 2006
[108] IBID – White House Website
[109] IBID – White House Website
[110] IBID – White House Website
[111] IBID – White House Website

Technology Program, $2 billion for the Climate Change Science Program, and $229 million for climate change-related international assistance programs[112]. In FY (fiscal year) 2005 there are also a proposed $680 million in energy tax incentives that promote GHG emission reductions and $4.1 billion more allotted through 2009[113]. These incentives, per the National Energy Policy, include credits for purchasing hybrid or fuel cell vehicles, residential solar energy as well as energy produced from landfill gas and electricity produced from alternative energy sources like wind, solar, and biomass energy production and combined heat and power systems.

The Climate Change Technology Program (CCTP) was created to accelerate the development of GHG emission reducing technologies. The program promotes research and development, deployment efforts, and voluntary programs aimed at reducing GHG emissions. The three main foci of the CCTP are hydrogen, FutureGen, and fusion energy.

The Climate Change Science Program (CCSP), a federal research program dedicated to investigating and understanding how human actions impact the global environmental system, has been allotted $2 billion in the 2005 budget[114]. They are to provide sound scientific evidence for national and international policy making. Part of the CCSP is the Climate Change Research Initiative (CCRI), the environmental research issue considered to be of paramount importance to the President. Climate issues like understanding aerosols, quantifying carbon sources and sinks, and improving modeling and forecasting technologies all are researched under the CCRI, which was allotted $237 million in 2005[115]. A large milestone for the CCSP was the establishment of a 10-year strategic research plan for U.S. Climate Change Science. This plan was formulated by an International panel of over 1,300 scientists and consultants and prioritizes the areas of focus for the CCSP over the next 10 years. Key to the understanding of climate change is the observation of earth's various global and weather systems. As such, the U.S. held the first Earth Observation Summit in July 2003.

Bush is being very conservative, choosing to research, model, and discuss future actions, but his plans are almost all voluntary in nature and do little to take immediate action. The only mandatory plan he proposed involves increased fuel economy for light model trucks. In a gross contradiction, legislation passed under his administration gave enormous tax incentives for the purchasing of low-fuel economy SUV's. As part of his economic stimulus proposal, small businesses could write-off the entire cost of an SUV purchase (up to $75,000), in one year, as a business expense[116]. This tax break is only available for SUV's and pickup trucks over 6,000 pounds, which usually get 15-20 miles per gallon of gas[117]. This tax break encourages business owners who don't necessarily need larger vehicles to buy them anyway because the economic incentives are so great.

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[112] White House Website – Global Climate Change Fact Sheet located at http://www.whitehouse.gov/news/releases/2003/09/20030930-11.html accessed on January 24, 2006
[113] IBID – White House Website
[114] IBID – White House Website
[115] IBID – White House Website
[116] USA Today Website – "Bush plan gives huge tax break to buyers of big SUVs", located at http://www.usatoday.com/money/autos/2003-01-20-suvs_x.htm accessed on January 24, 2006
[117] IBID – USA Today

While high efficiency hybrid vehicles are given up to $4,000 in tax credits, the government is subsidizing the entire purchase price of inefficient SUV's.[118]

In 2002 a group of 1,300 scientists met to evaluate the 2002 draft of Bush's Climate Change Science Program (CCSP). Their main criticisms were that it was too generalized and that it did not address how climate change would affect specific areas of the U.S. The generalizations mentioned are suspected to obscure the research objectives. There is also as an absence of well-focused goals in the plan[119]. The lack of focus on domestic impacts of Climate Change, other then economic impacts, is troublesome. Many areas of the U.S., especially coastlines and areas near waterways will most likely flood. Failing to take this into account is a drastic mistake, especially if one is concerned about economic impacts. Many cities that are economic cornerstones are located near coastlines. If they are flooded, then economic stability will be threatened. If climate change does have severe impacts to many domestic areas, then national disaster relief will have to be doled out. This could cost the nation billions, not to mention unnecessary grief or harm to citizens. Insurance companies will surely fold if widespread damage is done, just like they did after 9/11. After 9/11 the government was forced to insure companies and entities that couldn't find coverage anywhere else. Imagine the amount of insurance the government would have to offer if widespread damage happened and insurance companies folded in droves. Bush criticized Kyoto for not taking into account the economic impacts of GHG reductions, but Bush's plan does not factor in how climate change will affect our own lands, people, way of life, or economy in the long-term.

The Bush Administration believes GHG intensity is a complete measure of GHG reductions, but GDP and unemployment are not the only things that measure a nation's well being. If we keep the $400 billion and 4.9 million jobs by not ratifying Kyoto and choose to handle climate change lackadaisically we could stand to lose more infrastructure and lost productivity and even worse we could lose countless lives in the future. Many believe that it is better to 'pay' now and try to mitigate climate change, than be forced to 'pay' more and suffer more severely later.

Benjamin Prescott, senior research fellow at the Pew Center on Global Climate Change, believes that Bush is just taking old policies and 'dressing them up' with new titles and initiatives and calling them new programs[120]. Prescott mentioned that he believes the government could regulate GHG emissions, making them stricter over time, without shocking the economy. Other critics believe that Bush's prolonged studies and delayed actions are attempts to avoid holding his constituents, oil companies, refineries and utility plants, accountable for GHG emissions. An unnamed non-profit source called Bush's plan 'paralysis by analysis' and claimed that his constant conference hosting are tactics to make the public think they are taking action[121]. Apparently, the Bush Administration has done this recently with other issues of public concern like corporate fraud, child protection and minority fraud, all which garnered media attention but did not lead to substantial action[122]. Phillip E. Clapp, president of the National Environmental

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[118] IBID – USA Today

[119] Powell, Kendall, " Bush climate-change plan gets cool response", Nature, Vol. 420, No. 595, December 12, 2002

[120] United Press International Website – Gambell, Kathy, "Bush climate research plan sparks debate", located at http://www.upi.com/view.cfm?StoryID=20021204-082841-1601r accessed on January 24, 2006

[121] IBID – UPI Website

[122] IBID – UPI Website

Trust stated, "Most climate scientists around the world will see this (the Bush Plan) as fiddling while Rome burns. More research is always welcome, but the goal here is to delay doing anything about the problem"[123].

On January 18th of 2006 at an EPA-sponsored symposium commemorating the agency's 35th year anniversary, 6 former heads of the Environmental Protection Agency accused President Bush of neglecting global warming and other environmental problems. Five former chiefs were Republicans, one was a Democrat, all agreed that the Bush White House has displayed a failure of leadership with respect to global warming and the environment. The first chief of the EPA, when began operations in 1970 under President Nixon, Bill Ruckelshaus, stated, "I don't think there is a commitment in this administration"[124]. Russel Train, Ruckelshaus successor, stated " To sit back and just push it away and say we'll deal with it sometime down the road is dishonest to the people and self-destructive."[125] Lee Thomas, Train successor under the Reagan Administration stated, "if the United States doesn't deal with those kinds of issues in a leadership role, they're not going to get dealt with. So I'm very concerned about this country and this agency."[126] Stephen Johnson, the current EPA chief defended Bush, his boss, by saying that the White House has spent $20 billion on research and technology to combat climate change, after Kyoto was declined. Johnson stated, "I know from the president on down, he is committed" continuing with "…his charge to me was, and certainly our team has heard it: ' I want you to accelerate the pace of environmental protection. I want you to maintain our economic competitiveness.' And I think that's really what it's all about"[127]. Christie Whitman, the first EPA administrator under President Bush, stated, "You'd need to be in a hole somewhere to think that the amount of change that we have imposed on land, and the way we've handled deforestation, farming practices, development, and what we're putting into the air, isn't exacerbating what is probably a natural trend," she went on saying, "But this is worse, and it's getting worse."[128] Carol Browner, President Clinton's EPA administrator advised that Congress and the White House should push legislation to establish a carbon trading program based on a 1990 pollution trading program that helped reduce acid rain. Browner went on to state that, "If we wait for every single scientist who has a thought on the issue of climate change to agree, we will never do anything,". She went on to state, "If this agency had waited to completely understand the impacts of DDT, the impacts of lead in our gasoline, there would probably still be DDT sprayed and lead in our gasoline." [129]

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[123] Gugliotta, Guy, "Taking on Climate Change: Planned Study is Decried as Stalling" Washington Post Thursday, July 24th, 2003, page A06

[124] ABC News Website - Heilprini, J, "Ex-EPA Chiefs Blame Bush In Global Warming", Associated Press, Jan 19, 2006, Located at http://abcnews.go.com/Politics/wireStory?id=1520545 accessed January 25, 2006

[125] IBID – ABC Website

[126] IBID – ABC Website

[127] IBID – ABC Website

[128] CBS News Website – "EX-EPA Chiefs Blame Bush In Global Warming", Associated Press, January 18, 2006 located at http://www.cbsnews.com/stories/2006/01/18/ap/politics/mainD8F7CBO06.shtml accessed on January 25, 2006

[129] IBID – CBS News Website

Current EPA chief, Stephen Johnson (with microphone) fourth from left, is joined by former administrators, from left, Govenor Christine Todd Whitman, Russell Train, Bill Ruckelshaus, Lee Thomas, Carol Browner and Bill Reilly *(Courtesy of ABC News via AP Photo/EPA, Eric Vance, HO)*

Australia is probably the United States' closest ally in the decision to reject the Kyoto Protocol. Australia maintains that it will not ratify the Kyoto pact unless the United States and other developing nations (like China and India) get involved fully. This decision was reached because Australian Prime Minister John Howard believes that ratifying Kyoto will cost Australia jobs and hurt domestic industries. Prime minister Howard is not inclined to ratify Kyoto for these reasons, coupled with the fact that he does not believe Kyoto will be effective in reaching its goals if the United States and other developing countries do not participate. Australia and the United States have enacted a joint Climate Action Partnership (CAP), which consists of 19 projects to improve climate prediction, monitoring, and understanding of natural systems that drive global warming. None of these CAP programs are aimed at mitigating climate change, a theme that is consistent in the Bush Administrations domestic climate change initiatives. Independently, Australia has invested '$1 billion' into a greenhouse abatement program, which according to Dr. David Kemp (Australia's Federal Minister for the Environment and Heritage), "is on to deliver about 60 million tones annually in emissions reductions – the equivalent of taking all passenger cars off Australia's roads"[130] Australia's is feeling many affects of global warming as it's Great Barrier Reef is suffering from massive coral bleaching, caused by higher than average ocean temperatures[131]. The Great Barrier Reef is a major source of income for many Australian's through the tourism revenue it attracts as well as being an integral part of Australian history, tradition and national identity[132].

While it is true that Kyoto has negative economic impacts for the United States, those negative impacts may be more severe if no action or minimal action is taken. While it is true that India and China are unfairly excluded from Kyoto, if the United States ratified the treaty and started to participate in climate change conferences, a plan to phase in these countries could be created and enforced by U.S. The actions of the United States serve to lead other countries. By not ratifying Kyoto, or enacting a similar plan without the pitfalls of Kyoto (but which still requires mandatory and aggressive emission reductions), we are undermining the existing Kyoto pact and signaling to other countries to do the same. By promoting wait-and-see strategies the United States is signaling to the rest of the world to do the same. Economic gains could be realized if the United States

[130] Australia's Department of Environment and Heritage Website – "Beyond Kyoto – Australia and the US Collaboration on Climate Change and Oceans", Media Release for Environment and Heritage located at www.deh.gov.au/minister/env/2002/mr19nov202.html accessed January 31, 2006
[131] Australian News Website – Government should sign Kyoto" 1/31/06, located at http://www.news.com.au/story/0,10117,17998770-1248,00.html?from=rss accessed January 31, 2006
[132] IBID, Australian New Website

created and produced innovative technologies and processes that would be desirable to other countries. Additionally, the U.S. could force all foreign companies doing business with or in America to adhere to our climate change initiatives, thus creating an incentive for countries like China and India to ramp up their environmental stewardship. However, these positive possibilities can only be achieved if the United States takes a leadership role in climate change mitigation, not a subordinate position.

Conclusion

By examining aspects of climate change such as recent evidence and projections, uncertainties in science, human activity contributions, greenhouse gas mechanisms, ecosystem and agricultural impacts, costs and methods of coping with climate change, an image of the climate change scenario in the Unites States can be gleaned. However, to truly understand the total impacts of global climate change, a full study on the effects felt by other countries in the world would have to be undertaken. This chapter serves only to illustrate the domestic concerns facing the United States, regarding climate change. Consideration of foreign impacts, for their direct and indirect effects, must also be researched in order to truly understand the breadth and severity of the global and domestic situation.

The United States is the world's largest emitter of greenhouse gases and the largest consumer of non-renewable energy. By not participating in the Kyoto Protocol or enacting a legally enforceable domestic emissions reduction program, the United States has become the world's largest free rider. We are enjoying the environmental benefits resulting from the GHG reductions that other countries are sacrificing to make, while continuing to contribute the most to the climate change problem. Americans must ask themselves if they are comfortable being the people most responsible for climate change and at that same time doing the least (proportionately) to solve the problem. Since Americans have done the most to create the problem, moral and rational logic suggests that they do the most to curtail it.

The idea of intergenerational equity is a value concept that considers the rights of future generations. Intergenerational equity suggests that each generation has the right to inherit the same diversity in natural and cultural resources as previous generations, and enjoy the same access to the benefits provided by these resources. By this notion, present generations have the duty to protect the environment so that future generations have a chance to enjoy the non-substitutable public goods and services offered by it. The government has a duty to enforce this principle of intergenerational equity (with respect to the environment), but it has failed to do so by all accounts.

Global climate change is a reality. Some mechanical uncertainty exists, but the balance of scientific data suggest that the problem is getting worse and that reversing the warming trend will be difficult. The more we wait to act, the larger the problem becomes and the harder it will be to curtail. The escalating problem can be compared to compound interest and credit card debt. If you buy an item on a credit card and fail to make the minimum payments, the interests adds up rapidly. After some time you may find the credit card bill and fear making payments because the sum is so high. Perhaps you toil and wonder about declaring bankruptcy or trying to dispute the claim with the credit card company. Eventually, you start to make the minimum payments, but by this

time the total amount is so much higher than the initial purchase price of the item, it will be years before it is paid off. Perhaps your credit score has been affected by this lack of payment and you have been turned down for a home loan or otherwise been prevented from performing certain activities because of your past payment indiscretions. In fact, for many years you will just be making payments to cover the accrued interest, unless you submit a large some of money to the credit card company upfront. By submitting this larger fee in the initial stages of debt payback, you will reduce future interest rate percentages and decrease the amount of time and money remaining on your financial obligation.

This credit card situation is similar to the climate change scenario. Here is the rationale: The United States invests in (buys) a fossil fuel based economy and infrastructure (credit card purchase). Negative externalities of fossil fuel combustion are not factored into the price of the oil (minimum payments are not made). Years go buy and climate change begins to emerge. The government realizes the problem (finds the credit card bill), but toils instead of acting, because the investments they and their constituents have made are considerable, and costs to curtail the problem will affect their investments too severely (still no payments are made). The government tries to argue with the United Nations (the credit card company) to dispute climate change science and mitigation strategies (but the company has proof of purchase and is in no danger of folding or losing power). Unfortunately for the U.S. debtor, there is no option of declaring bankruptcy, unless the entire government folded and massive recessions ensued. Eventually, sometime in the future, the U.S. will start to invest in mitigating climate change (make the minimum payments on this purchase), because the problem (creditors and interest) will not go away. Perhaps, in 2006, we are only making minimum payments. Continuing on in this manner could mean that we will suffer more severe climate change related costs and damages, and prevent our economy from adjusting to the concerns of future generations indefinitely (credit score is lowered and we lose out on options for other desirable activities). However, if we ratify Kyoto, or enact some other form of action-based, legally-enforceable emission-reduction program that will affect the economy (if we make a large initial payment upfront), we could get to the end goal of climate change mitigation and adaptation faster, avoiding extraneous damages from unchecked climate change (compounding interest payments).

The point to this metaphor is that the precautionary investments to mitigate climate change will preserve future options and reduce risk. The 'funnel problem' concept suggests the later we invest in environmentally sustainable practices, the fewer options we will have. Even if new infrastructure and technologies become obsolete relatively quickly, the most important thing is that we are moving away from practices that are proven to be harmful and unsustainable. If we invest early in technologies that have longevity, we could reach economies of scale faster, enabling cheaper technologies to be offered in the market and a faster return to economic growth. Even if climate change science has an inherent degree of uncertainty, investments into developing technologies and sustainable practices can only help to solve the problem and enable our economy to transition into the future.

The future of America and the rest of the world is one of increasing populations, decreasing resources, increased competition and continued climate change. An evolved and educated species, interested in self-preservation, would not destroy the very thing

that enables it to live. This begs that question, are humans really that intelligent or evolved? Perhaps it is events like global warming, that unite large populations of humans (species) towards a common cause, that allow for evolution and realization on a large scale. Perhaps only when faced with the massive devastation and catastrophic change do species learn, react, and evolve.

Lastly, a public good, as defined in economics, is a good or item that is difficult or economically undesirable to produce for private profit. This is because the good is non-rivalrous (many people can enjoy it at once without diminishing other's enjoyment) and non-excludable (once it is created, it is hard to prevent access to the good, thus it is hard to collect payment for the good). Public goods often have considerable beneficial externalities that the market does not account for. Clean air, environmental goods, defense and law enforcement are all public goods. The natural environment has the added disadvantage of being a public good that is considered a common good, because it is competitive and non-excludable. There is competition involved in obtaining it and consumption of it cannot be prevented. This is problematic because you have unlimited, unremunerated, consumption of the natural environment, because it is a free good, and competition for the resources it provides.

This leads to the free rider problem, where some entities consume more than their fair share of a resource or shoulder less than their fair share of the costs of its production. With respect to the United States, we are double offenders, consuming the majority of natural resources AND contributing less than our fair share of compensation for those resources (in the form of payments to curtail GHG emissions or other pollution mitigation strategies). A public good is a market distortion since the private market will not supply it, because they cannot earn a profit from such production. The environment and the services it renders are not offered by the private market (and possibly cannot be offered, because of poor substitutability), because there are insufficient incentives to produce it voluntarily. Only governments and legislation can protect public and common goods through regulations and legislation. The environment and it's services, public and common goods, have gone too long without adequate protection from the U.S. government.

A constitutional environmental right would be the most compelling tool to protect the environment, a public and common good, preserve intergenerational equity, account for externalities, spur investments into sustainable technologies, reduce risk of future costly climate change related damages, and signify a commitment from America to the International community that we are ready to be leaders, not free riders.

An American Evolution – Economics Chapter

Christina Simeone

Introduction

Economic realities are some of the most powerful forces working against the establishment of stricter environmental regulations and a Constitutional environmental right. It is important to understand how certain aspects of Americas economy, government economic policies and corporate structures affect the environment and society. At the heart of many environmental problems lies the very economic foundation of our society, capitalism. Although capitalism is one of the most successful ways to organize a society, it is incurring many problems as populations' increase, resources diminished and environmental degradation becomes widespread. The global proliferation of capitalism and the pursuit of economic growth is changing the earth. As the world strives to increase economic activity and production, global and local environmental problems are being created and societal welfare may be stagnating. The preoccupation with short-term economic goals is being carried out at the expense of the environment and the livelihood of future generations. Unfortunately, reality paints an extremely bleak picture of an impersonalized, economic human agency barreling down a dead end path of consumption and profit seeking without interest for consequences or survival. This is appropriately alarming, but nothing that is particularly hidden or unknown. In fact, I suppose that many people believe that America is too greedy and money-oriented, but the problem seems too big to address on an individual basis. A form of cognitive dissonance results as people intuitively understand that America's actions are precarious, but convince themselves that everything is okay because they don't want to change their own lifestyles or do not know how to create widespread societal change. I pose the amendment of an environmental right into the United States Constitution as a vehicle to address the problems that have evolved within the American economy and economic practices.

This chapter will begin with an overview of economics to relate some fundamental principles. The concept of externalities will then be discussed, an important idea to understand in relation to environmental harm. Next will be a discussion of government cost-benefit analysis procedures and their inherent difficulties associated with environmental attribute valuation. An examination of the role globalization has played in degrading the environment for economic gain will follow as well as a discussion about the problems related to how the United States measures national well being through the Gross Domestic Product (GDP). The next section will illustrate how capitalism and the proliferation of publicly held corporations have resulted in a pervasive pattern of short term thinking that holds the self interested pursuit of profit as the only desired outcome. The chapter ends with a summary and conclusion, maintaining that a Constitutional environmental right could curb many economic practices that result in negative environmental impacts.

Economics Overview

Adam Smith is considered the father of classical economic thought. Classical economics marked the transition from feudal rule where the King's personal interests and treasury benchmarked a nation's priorities and wealth, to the rise of capitalism where individual interests, class-based systems and annual national income became the new benchmarks. Adam Smith's, *Wealth of Nation's (1776),* identified the idea of the 'invisible hand', which maintains that an individual acting in his own self-interest is led by an invisible hand to promote the public interest. This theme of 'enlightened self interest' supposedly guides the system of capitalism to be both beneficial for the individual and the community. Applied specifically to the economic market, the 'invisible hand' maintains that a free market (absent of government interference) will guide the production of the correct amount of products to be sold at the correct prices, based on demand from consumers. This theory assumes the consumers are allowed to chose from a variety of goods and services supplied from producers. The invisible hand theory rests on the belief that people will work hard and be productive and achieve the best level of support for their families. Thus, a productive economy, reliant on hard work and vigorous consumer expenditures, will be more efficient and prosperous. Projected on the entire nation, every worker motivated by his or her own self-interest will incrementally increase overall economic productivity leading to increases in the standard of living for society as a whole.

Modern economic thought expands on the ideas set up by classical economics. Modern economics rests on the assumption that resources are scarce, and as a result tradeoffs exists. Each alternative must be measured against competing alternatives to find the most optimal course of action. Choosing one alternative means foregoing another alternative, which results in an opportunity cost. Opportunity costs are the costs associated with abandoning possible alternatives (or opportunities) in favor of a particular course of action. In order to choose between competing alternatives, government economists use various principles and tools to guide their decisions. One principle used is the idea of utility. Utility is a measure of how much satisfaction a consumer gains by the consumption of a particular good or service. Competing courses of action are usually compared on the basis of utility, how much utility will decrease or increase from one tradeoff to another. A tool used by the government to make allocative decisions is the cost-benefit analysis, which will be discusses later in this chapter.

There are some problems with the idea of the invisible hand as it applies to modern economics and the environment. This problem can be appropriately illustrated through the idea of 'The Tragedy of the Commons"[1]. This idea maintains self-interested competition for limited resources will detract from the common good. Hardin's essay explains the tragedy as being related to population growth, but displaying itself in many areas within the economy, including the environment. The following example explains the tragedy of the commons:

> Many industries exist in an area to produce products to be sold for consumer consumption. As a result (or externality) of the production process, certain pollutants are created and released into the air or water. All the companies in the area, along with the consumers, share the same access to air and water

[1] Hardin G, "The Tragedy of the Commons", *Science*, Vol. 162, December 13, 1968, pp.1243-1267

> depositories for their pollutants. Each company desires to maximize their production yield to increase profits, so they all operate to capacity and release the maximum amount of pollutants possible. The companies receive the positive benefit of receiving all the proceeds from the sale of their products. The companies impose the negative aspects of pollutant release on the community, as the environment is degraded. As a result, each individual company will reap all the benefits from increased pollution, but will distribute the costs of pollution among many others. All the companies in the area will choose to emit the maximum amount of pollutants in an attempt to increase production and maximize their profits. This situation will lead to over-pollution and degradation of the environment. Community members could face increased health risks, decreasing property values, diminished aesthetic environmental quality and other nuisances related to the self-interested behavior of the area companies. The common people are faced with a tragedy because of the self-interested actions of the small group of companies.

Adam Smith's invisible hand perhaps did not account for situations such as these where population growth, pollution increases, and/or limited resources may affect the ability of self-interested action to account for public interest. Adam Smith argued for a 'laissez-faire' system where markets would be free from government interference. In the scenario above, government interference in the form of pollution regulation is needed to increase the cost of pollution to protect the public from the self-interested behavior of the polluting companies. Without such regulation, polluters could pollute limitlessly in a world that has limits. It is important to note that not every individual would harm the greater good for personal gain, but it is certain that some entities would. Hardin's essay is a call for limitations and regulation by the government to protect the general public from the actions of the unethical self-interested that would pursue their own gains at the expense of the common good. In this way productivity and a standard of living can be pursued by all, with limitations on the negative impacts that could result from this generally beneficial behavior.

Related to the harmful self-interested behavior illustrated in the tragedy of the commons, is the idea of the free rider problem especially related to public goods. A public good is 'non-rivalrous' and 'non-excludable'. 'Non-rivalrous' means that one persons' consumption of a good does not reduce the amount of the good available for others to consume. An example of a non-rivalrous good is the breathing of fresh air, one person can breath air without diminishing the amount of air available for others to breath. An example of a rivalrous good is a pizza, if one person eats two slices, there will only be six slices left for others to eat. 'Non-excludable' means that it is impossible to exclude people from consuming the good. Again, breathing fresh air is a great example, because you cannot practically prevent people from breathing it or having access to it. An excludable good is one that you can easily attach a price to and prevent or grant access to the good depending on remittance of payment, such as a pizza, video game, automobile, etc. The tragedy of the commons can be related to public goods like the environment, or common pool resources (rivalrous, non-excludable), such as the fish in the sea, herding pastures, etc.

Public goods are extremely problematic because unlike private goods, they cannot be easily bought and sold in the market. The reason for this is that there are no incentives

to produce them. A producer who is looking to make a profit will not be interested in producing a good that could be shared by everyone (non-rivalrous) and obtained for free (non-excludable). This is because the produce will incur the costs of production, but will not be able to prevent consumers from consuming the product freely. Consumers can enjoy public goods without contributing a proportional share to their creation; this is the 'free rider problem'. This free rider problem makes public goods extremely unattractive to producers and even more attractive to consumers. The following example can be used to illustrate one way in which the free rider problem can be related to the environment:

> A rational, self-interested person will only consider benefits and costs directly related to his or her self. There will be a considerable incentive for this person to consume public goods like clean water and fresh air, without paying proportionally for their consumption. They may pay income taxes, but these payments do not accurately represent payments for the amount of benefits they are receiving from these public goods. This person may consider paying more money or performing extra actions to improve the environment and compensate for the extra benefits he or she is receiving. Perhaps the person contemplates taking public transportation to work, volunteering to pick up neighborhood trash on the weekends, participating in a recycling program, or donating money to an environmental organization. However, the person may realize that any individual effort performed will have very little benefits, since the limited effort will be spread out over the entire population. The individual may further realize that these actions may be inconvenient and could prevent him from participating in more desirable activities or purchasing more desired products. The individual may then come to the conclusion that the additional efforts or contributions are unnecessary because they will have limited effectiveness and the person cannot be excluded from the benefits of the environment regardless of whether he performs these additional actions or not. As a result, the free rider will not perform additional actions or make additional contributions unless they provide some sort of inherent pleasure or reward. The inherent pleasure may result from a 'feel-good' emotion that occurs for doing the right thing and the reward could result from a tax credit, rebate, subsidy, etc.

As you can see, the free rider problem is pervasive with respect to environmental services. The invisible hand guides every individual to act in their own self-interest in the consumption of public goods, and there is little incentive to correct or limit these actions.

If the majority of people derived utility or inherent pleasure from contributing or acting to protect the environment, the free rider problem could be solved. However, this is highly unlikely. The more rational approach would be to implement government regulations or interferences to correct for the problem. Other public goods such as national defense or law enforcement, are readily viewed by the public as services afforded to them through tax payments. Although citizens do contribute to the funding of these services, they benefit proportionately more from these services then their cost contributions would reflect. The goods and services that the environment provides are not even remotely addressed through taxes on the population. Some income tax money goes to enforce environmental regulations, provide public water and sewage treatment, or create waste disposal landfills. However, the majority of goods and services that the

environment provides, such as breathable air, air and water purification, energy input, diverse species, and a stable climate are not proportionately compensated for through the income tax system. Some polluting industries pay higher taxes to compensate for their environmental harms, but these extra amounts are directly related to the non-normal pollution that they emit. The average American does not pay more or less for the environmental public goods and services that they consume. These goods and services are often taken for granted, and/or perhaps are seen as natural inputs that every human being is entitled to. It is rational to think that inputs publicly viewed as inherently owed to the human species not be compensated for in income tax payments. If these environmental inputs are viewed as a birthright to every human being, it could be said that they are an inalienable 'right'.

The idea of the invisible hand in classical economics applied to the time it was created in the late 1700s to early 1800s. As Hardin points out, in the face of scarce resources and increasing populations, the invisible hand seems to fail as self-interested behavior trumps concerns for the national (or global) community. This shows how time and changing circumstances can distort once-accurate theories and practices. Similarly, environmental goods and services are perhaps unconsciously believed to be the birthright of every human being. It could be said that historically, many believe this birthright entitles every human to obtain free access to environmental goods and services that are essential to sustain life or enhance the quality of life. I maintain that this belief exists today, with one major flaw. Environmental goods and services are an inalienable right that every human being is entitled to, however, in the face of increasing populations, self-interested behavior, diminishing resources and over-consumption, these goods and services require increased compensation in order to protect them for current and future generations. Environmental goods and services, specifically an environment suitable to the health and well being of humans, must be recognized as a Constitutional right afforded to all people in the United States. A specific level of environmental quality for all mediums (air, water, soil, etc) must be determined and expressed as part of this Constitutional right. In order to provide that specific level of environmental quality to all humans in America, taxes will have to be increased to pay for the increased amount of protection. This is both an affirmation of the historical belief that the environment is a fundamental right and a rejection of the historical belief that humans can enjoy environmental goods and services for free. Even with the imposition of an environmental tax, it would still cost people proportionately less than the enormous benefits they receive from the environment. This tax will not be a payment for environmental goods and services, it will be a payment to protect the environment and enforce the environmental right.

Externalities

One of the most important concepts to understand when discussing economics and the environment is the idea of externalities. An externality is a positive or negative side effect of market operations, where parties other than the producer or the consumer bear the benefit or burden of those side effects. Externalities can occur as a result of consumption or production activities. The costs or benefits of externalities are not inputted into the purchase price of the goods, whose production or consumption has

created the externalities. In this sense, a product that creates negative externalities will be under-priced because the price does not incorporate the negative impacts resulting from producing or consuming that good. Examples of externalities are:

- The prices of cigarettes do not reflect the negative externalities borne by the smoker or those exposed to second hand smoke, namely the risks of lung cancer. Some of these risks are not born by the producer or the consumer, but by an unrelated third party.
- A negative externality resulting from copper smelting can be air pollution that causes tuberculosis or contributes to acid rain. Nearby residents could develop tuberculosis or other ailments as a result of the smelters operations.
- Local farmers could have their crops negatively affected by the acidity of the precipitation. The products produced by the copper smelter do not factor in the increased costs associated with increased pollutant exposure, such as the health related or economic risks experienced by local residents or farmers.
- A new development is built in a suburban area. This development adds many impervious surfaces to the landscape, which prevents storm water from being able to seep into the ground and be drained through natural processes. As a result of the new development, several area stream banks have eroded and damage has been done to local infrastructure because of increased flooding. Downstream residents have lost property near the stream banks, which has resulted in a real economic loss. The price of the development to producers and new homeowners does not factor in the increased costs born by the downstream residents or the municipality.

Externalities are considered a market failure, because the market does not account for the extra costs and benefits that result from them. Negative externalities are particularly related to pollution and environmental degradation. Third parties that do not contribute to the consumption or production of the goods are forced to bear the negative consequences that result from their creation and/or use.

If the prices of goods included a sum related to the negative externality, that results from the production or consumption of that good, many harmful products would become more expensive. The increase in price would decrease the demand for such harmful goods. Decreased use of these goods would prevent third parties from having to bear the higher risks related with these products. For example, if the price of a battery only includes the private cost associated with its production plus a profit margin, then its market price will be too low. Batteries will be cheap and bought frequently. If externalities are accounted for, the new market price of batteries will effectively be the 'social cost' of batteries, which includes the private costs of production, profit margin, and the cost of externalities. Externalities that result from battery production could be mercury, cadmium, SO_2 and lead emissions, fossil fuel combustion related pollution, and particulate matter pollution, that all have negative health impacts. Externalities related to consumption could be the difficulties related to disposal of the batteries. If these externalities were monetized and added to the cost of each battery, the prices of batteries would go up. This increase in price would cause consumers to purchase fewer batteries,

or invest in batteries that can be recharged. As a result, harmful pollution related to battery production and consumption would decrease. It could also lead to opportunity in the market for innovative producers who come up with new ways of producing and delivering portable power sources to the consumer without creating pollution. Attempting to account for the costs of externalities is often referred to as 'internalizing'. Economists are historically not trained or directed to quantify or 'internalize' these externalities. As Kirkpatrick Sale points out, "Economists ignore this information not because they are idiotic, cruel or dumb, but because they are conditioned by their education to see the natural world only as resources; they do not understand the complexities of the science of ecology."[2]

Imposing taxes on pollution and polluting activities is one way to monetize and correct for negative externalities. New approaches to taxation could prove successful in reducing externalities by increasing their associated costs. Taxes on air, water, effluents, solid wastes and products with environmental impacts could increase the costs associated with these products and forms of pollution. This would cause pollution producers to try to limit the production of pollution through employing efficient technologies or through spurring innovative production processes. These 'polluter pays' taxes could increase the amount of tax revenues to the U.S. Treasury. This could cover the administrative costs associated with the new taxes and partially offset the increased costs of implementing and environmental right. Successful examples of these polluter pays taxes are numerous, such as the tax levied on ozone-depleting chemicals which raised over $2.9 billion in five years and reduced ozone depleting chemicals by 385 in its first year alone[3]. Another example is the Superfund tax, which was imposed on oil, chemical and other companies in order to pay for the cleanup of toxic waste sites. The Superfund tax raised more than $20 billion from 1980 to 1995 for the Superfund Trust, which pays for cleanups[4]. Despite its early successfulness, the Superfund tax was not renewed, because taxpayers not the polluting companies seemed to be contributing increasing amounts into the trust fund.

Craig Hanson and David Sandalow believe that taxes have advantages and concerns compared to regulations. The advantages are that pollution taxes are more efficient, flexible, generate revenue and can stimulate continuous technological innovation[5]. Regulations are often imposed uniformly on all regulated entities, even those who are in compliance, which may be inefficient. The advantages of taxes are that pollution reduction can be more efficient, allowing higher levels of reductions to those companies who can carry them out most cost effectively. Pollution taxes are flexible because they allow the regulated entities to decide how to decrease pollution. These taxes generate revenue and could be seen as more credible and enforceable then environmental regulations since they are associated with the Internal Revenue Service as opposed to the Environmental Protection Agency. These taxes could also spur continuous technological innovation as ways to avoid subjection to increased taxation.

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[2] Sale K, "An Illusion of Progress", The Ecologist, July/August 2003, p. 26
[3] Cook E, *Making a Milestone in Ozone Protection*, World Resources Institute, Washington, DC, 1996
[4] Lazzari S, *Taxes to Finance Superfund*, Congressional Research Service, Washington, DC, 1996
[5] Hanson C, Sandalow D, "Greening the Tax Code", Policy Brief: Tax Reform and the Environment, The Brookings Institute & The World Resources Institute, located at http://www.brookings.edu/views/papers/sandalow200604wri.pdf accessed on June 14, 2006

Hanson and Sadalow note that pollution taxes are well suited for pollution that is caused by a large number of polluters, where multiple technologies exist to fix the problem and when the pollution involved is relatively easy to measure and monitor[6].

Some concerns related to pollution taxes are their regressive nature and possible instability over time[7]. The regression concern is because pollution taxes could disproportionately affect the poor by raising the cost of necessity consumer goods such as energy. The wealthy have more income and will be able to absorb the higher costs, but the poor will struggle to meet their basic needs. Long term stability of pollution taxes are also questioned since the tax tends to eliminate pollution and eventually reduce tax revenues. To address these concerns, Hanson and Sandalow believe that fundamental tax reform packages should accompany these pollution taxes to correct for the disproportionate impacts, such as earmarking revenues received from carbon taxes to reduce payroll taxes for low-income brackets[8].

The Organization for Economic Co-Operation and Development (OECD) found that developed countries collect and average of 5.7 percent of their national government revenue from environmental charges[9]. In 2003, the U.S. collected significantly below the average at about 3.5 %, which is less than half of what the UK collected 7.6%[10]. Why should the U.S. be so markedly different in their environmental revenues compared to other developed countries? The U.S. often cites the economic effects of environmental regulations or taxes as reasons not to adopt them. However, the rest of the developed world seems to be able to tax and regulate with out the dire economic consequences U.S. politicians are so concerned about. Pollution taxes seem so elementary and fundamental it is hard to believe that the U.S. does not have more of them. David M. Roodman, notes that in the United States, the unpaid costs to society of driving – ranging from lung disease to noise pollution – are estimated at $218 billion per year[11]. These externalities represent enormous costs that are being forced upon unaware victims. Taxes could increase the cost of negative activities, such as driving cars that inefficiently burn fossil fuel, and reduce the associated indirect costs. In this case, shouldn't drivers of the inefficient cars pay more instead of the non-drivers absorbing the extra costs in the form of indirect and adverse health effects? A tax that would make gasoline more expensive may also increase the demand for fuel-efficient cars, furthering the environmental benefit of such a fuel tax. A report by Consumer Reports confirms the relationship between gas prices and demand for increased fuel economy, indicating that high gas prices cause Americans to seek out smaller, more fuel-efficient vehicles[12]. In the absence of quantifying all the externalities of a product and adding it on to the price of the good for

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[6] IBID, Hanson and Sandalow, p. 4
[7] IBID, Hanson and Sandalow, p.4-5
[8] IBID, Hanson and Sandalow, p.4
[9] Organization for Economic Co-Operation and Development Website – "OECD/EEA Database on instruments used for environmental policy and natural resource management – environmentally related taxes, fees and charges", located at http://www2.oecd.org/ecoinst/queries/index.htm accessed on June 14, 2006
[10] IBID, OECD Website
[11] World Watch Institute – "Shifting Tax Burden to Polluters Could cut Taxes on Wages and Profits by 15 Percent", May 10th 1997, located at https://www.worldwatch.org/node/1609 accessed on June 15, 2006
[12] Consumer Reports Website – "Drivers Feel Pressure at the Pumps", May 2006, located at http://www.consumerreports.org/cro/cars/news/fuel-economy-survey/overview/p83292.htm accessed on June 15, 2006

the consumer to pay extra AND forcing the consumer to incur the negative impacts of the pollution, forcing the polluter to pay seems more appropriate. The goal of environmental taxes is to allow markets to work more efficiently, without externalities distorting the true value of goods, activities and services. In essence, these taxes are attempts at environmental and economic honesty.

According to Joel Bakan, it is standard practice for corporations to externalize costs to make unrelated third parties pay for corporate actions and transactions[13]. In his book, The Corporation, Bakan quotes Robert Monks, an investment specialist, who calls corporations 'Externalizing Machines'. Corporate ideology is to ensure that someone else pays the costs so that the corporation can make a profit. For example, if the corporation dumps waste into a stream, the public is forced to pay the remediation costs through taxes. The corporation saves money and earns a larger profit because they did not have to pay to have the waste removed properly. The environment is a vulnerable target for corporate externalizing, because it has no owner or guardian who has accountability over it. Environmental regulations exist to prevent profit seeking behavior by corporations and businesses that exploit the environment and impose costs and risks on the public.

Environmental protection efforts to limit pollution, such as cap and trade systems, emissions limits, and smoke stack scrubbers, can reduce the amount of some externalities that result from the product production process. However, the pollution that remains and the impacts of product consumption are still not factored into the product price. Payments made by producers to federal and state environmental protection agencies could be argued as attempts to pay for these environmental externalities. Since these payments are included in the private costs of producing the product, it could be said that the cost of these externalities are being factored into the market price of these goods. However, there are problems with these assertions. Funds paid to ameliorate fines or comply with environmental protection agencies represent mandated costs that are required in order to operate the facilities and produce products. These funds reduce environmental externalities thus affording a baseline of environmental protection to consumers and third parties while enabling producers to operate and make a profit. These necessary funds do not account for externalities related to the remaining pollutants released or the externalities resulting from product consumption. In this sense, monies paid to environmental protection agencies do not fully account for negative environmental externalities. If all the externalities from production and consumption of a product were calculated, they would be significantly higher than the amount paid to environmental protection agencies. Clearly environmental regulations do not completely correct the problem of negative environmental externalities.

A Constitutional environmental right could mandate pollution taxes or the development of an institutionalized environmental labeling program, both of which could account for negative environmental externalities. A government run eco-labeling program would initially be voluntary, with the idea that perhaps in time it could become mandatory. Environmental labeling would require products to display information about the environmental impacts related to the life cycle of the product. This would educate consumers about the products they are buying and hopefully encourage producers to improve the environmental performance of their products. Many of the negative

[13] Bakan, J, *The Corporation: The Pathological Pursuit of Profits and Power*, Free Press, 2004

externalities created by the production and consumption of the product would be calculated in the environmental lifecycle rating displayed on the eco-label. In this sense the true impact of the product would be understood, even if it was not monetized and inputted into the market price of the good. There are obviously costs associated with an environmental labeling scheme. These costs would be borne by producers, consumers and the government. Perhaps even a tiered cost system could be developed so that environmentally harmful products will be charged more than innocuous products. This is reasonable since harmful products are more likely to have complex pollution and waste issues that will take more funding resources to properly quantify and label. Mandatory environment labeling presents free trade issues, which will be discussed in the recommendations chapter. A voluntary scheme should allow eco-labeling to be acceptable under WTO guidelines.

Cost Benefit Analysis

A cost-benefit analysis (CBA) is a study of the social costs and benefits resulting from a particular action. In its most basic form a CBA consists of the systematic calculating of all benefits and costs, valuing them in dollars amounts (assigning weights), and determining if there is a net benefit (total benefits minus total costs) compared to the status quo. The CBA is a tool used by the government to help allocate limited resources to those projects or uses that will result in the highest benefit to society.

In 1981, President Reagan issued Executive Order 12291 which required a cost-benefit analysis be performed for every major regulatory effort. In 1993, President Clinton confirmed the government's commitment to CBAs when he issued Executive Order 12866. Executive orders are not law. There have been no legal acts passed by Congress requiring that the government perform CBAs. There are several smaller legislative acts that require CBAs under certain circumstances. The Unfunded Mandates Reform Act of 1995 requires government agencies to perform CBAs for all regulations likely to cost over $100 million or more per year. The Treasury and General Government Appropriations Act of 2000 requires the Office of Management and Budget to report information on the costs and benefits of government programs as well as issuing instructions on how to standardize measures of costs and benefits. It is important to note that a CBA identifies the course of action that yields the greatest net social benefit thus improves overall societal welfare. However, government agencies are not required to take the action determined to be most beneficial for society. Another course of action can be taken that does not yield the greatest net social benefit as long as it is accompanied by the reasoning behind the alternate decision.

There are many practical problems with CBAs, which do not exist in theory. These problems include: determining whether an impact is a cost or a benefit, how impacts will change over time, how to convert impacts into dollar amounts, and how to compare tradeoffs between the present and the future. Some impacts may result in a benefit for some, but a cost for others. When looking at society as a whole, how do you compare these groups? Some impacts may initially result in higher social costs, but over time will yield larger social benefits. How should that be assessed? Some impacts will result in consequences that are difficult to quantify. Finding a dollar value to measure the costs of a polluted river will be much harder to determine than the costs of destroying a building. Comparing the desires and needs of the present population to the desires and

needs of future populations is extremely difficult. Present generations must remain robust in order to ensure the existence of future generations, while future generation must be given adequate resources and necessities to ensure the survival of the entire human species. There are other problems such as, is it fair to allow one group of people to incur costs in order for another group of people to incur benefits?

CBAs can help achieve the most efficient amount of regulation for a particular problem. Theory would maintain that a regulatory policy should continue to invest in regulation until the marginal benefit of the regulation is just above the marginal cost associated with implementing the regulation. However, in practice it is very hard to determine these marginal benefits and costs with any degree of certainty[14]. With respect to the environment, there are many problems with CBAs. The main problems that will be focused on in this section are non-market valuation, the discount rate, substitutability assumptions, biases in calculating costs and benefits (such as excluding externalities or environmental benefits), and public risk tolerance assumptions.

Non-market valuation is the attempt to put a dollar value on items that cannot be bought and sold in the market. An apple is an item that can be given a price and easily sold on the market. Improved water quality is a non-market item, it cannot be sold on the market and it is very difficult to attach a dollar value to. Certain methods are used to find dollar values for non-market goods so that they can be inputted into a CBA. For example, the benefits of a water quality enhancement program will have to be derived so that they can be measured against the costs incurred to carry out the program. Some argue that putting a price on nature destroys the notion that it has value, by allowing it to be traded as a commodity[15]. However, CBAs are very valuable in the process of allocating limited funding resources, so quantifying environmental goods and services are necessary.

There are various categories of services that the environment can provide, such as: 1) resources for production, 2) sinks for production and consumption wastes, 3) amenities to households, 4) life support services[16]. Determining a person's willingness to pay for an environmental attribute is important since willingness to pay is how economist derive the demand for a certain good. Finding the demand for an environmental good will allow the economist to understand how much of that good should be supplied. If a program results in less than the amount demanded, the CBA would tabulate a cost. If the program delivered more of an attribute then was demanded then the CBA would show excess benefits. Depending on the entire scope of the program, costs could be lowered by reducing the amount of benefits delivered so that the amount of benefit from the environmental attribute delivered from the program was just at the level demanded by the public's willingness to pay. This saves scare funding resources and makes the project more efficient, while still providing the public the level of benefit they demand.

Attempting to ascertain the public's willingness to pay for environmental attributes is very difficult. Many services the environmental provides do not and have never had a dollar value attached to them. Environmental goods like lumber, oil, and

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[14] Arrow et al, "Is there a role for benefit-cost analysis in environmental, health and safety regulation?", Environment and Development Economics, Vol. 2, 1997, p. 196-201

[15] Rahmatian M, "Session 19: Non-Market Valuation (PowerPoint Presentation)" Nov 2005, located at www.iwlearn.net/publications/misc/caspianev_rahmatian_nmv.ppt accessed on May 16, 2006

[16] IBID, Rahmatian

coal are straightforward to value because they are commodities that can be sold on the market. Environmental services like natural processes of air and water purification, scenic beauty, wildlife habitat, and population life support are more difficult to assess. When considering government programs, it maybe hard for the government to understand how much the public values incremental improvements in air quality or the preservation of a national park. The government must obtain a value for these and other aspects in order to know how much funding resources to allocate to the project. Similarly, when the government is trying to assess the impacts of a project that destroys 100 acres of forest in order to build a highway, they must know what the environmental costs are associated with that project. Do the costs of losing the forest include only the value of the property, the impact on local property values, and the loss in possible future timber production? Or do they also consider the loss of 100 acres of air purification and carbon sinks, the loss of species habitat, and the loss of scenic beauty? As you will find, attempts are made to find the value of many environmental inputs, but more often than not, key values are omitted because of inherent limitations of the valuation methods.

There are market-based and non-market based methods of valuing environmental services. Market based methods can include production function, cost of illness, cost-based, travel cost and hedonic pricing methods. Contingent valuation survey is the main type of non-market based approach. The production function measures the value of 'use' a resource provides in the production of a market good. The cost of illness approach estimates the cost of pollution through the medical costs and losses in productivity associated with illness. At its most micro level this attempts to find the incremental health effect associated with a does or level of pollutant. The main problems with this approach is that it does not consider peoples desire to avoid illness and that it is nearly impossible to measure the health affects associated with ambient pollution.

Cost-based approaches attempt to value environmental goods by estimating the costs it would take to restore that good to its original condition (remedial action) or the costs associated with maintaining the benefit that good provides. Additional forms of the cost-based approach include: the indirect opportunity cost, relocation cost, replacement cost, preventative expenditure, and damage costs avoided methods. Cost-based methods can severely underestimate the benefits related to an environmental input. This is because the cost-based approach assumes that expenditures to replace a good or maintain good provide positive net benefits and the net benefits produced match the original level of benefits. These assumptions are often inaccurate. It also assumes that restoration or replacement is possible, which may or may not be true. If a project to improve the water quality of a local river is being considered, the benefits of the water quality improvements may be valued at the cost it would take to restore that water to pristine conditions. However, the CBA will likely underestimate the benefits associated with that water by assuming that the water can easily be treated and restored to its original condition. In actuality, the water might be extremely difficult and expensive to clean because multiple sources are contributing to pollution and perhaps the riverbed is soaked with contaminants and needs to be dredged. The CBA may assume that standard methods of water treatment will be sufficient to clean the water, implying a smaller cost of remediation, which translates into an underestimated level of benefits. Similarly the cost-based method assumes that a net benefit can be achieved by restoring the damaged river to its original condition. If the actual cost of this procedure is significantly higher

than the cost-based approach originally indicated, the costs of restoring the river may outweigh the benefits delivered by the rehabilitated river. In this sense, the original cost-based calculations underestimated the benefit of improved water quality by undercutting the true cost of the procedure.

The travel cost method attempts to assign a dollar value to an environmental good or service through measuring a persons willingness to pay to reach a certain destination. For example, the per person benefit of a national park is measured by how much that person spends on traveling (time, gas, tolls) and admission to visit that park. This method involves obtaining information that is difficult to collect in practical terms. Also, this method only measures the value a person gets in using the park, while in actuality the person may derive value in simply knowing the parks exists (altruism). Hedonic pricing methods attempt to derive the value of an environmental amenity from property value or labor costs. Hedonic pricing is usually used in conjunction with environmental goods and property values. For example, the hedonic pricing method could be used to estimate the value of open space on property values in a rapidly developing area. Property values of homes located near open spaces can be obtained and as the open space becomes developed, the subsequent decline in property value could be seen as the value of the open land. The Hedonic pricing method has some limitations with respect to environmental valuation; environmental benefits are limited to measurements related to housing prices and it only captures people's willingness to pay for perceived environmental benefits (people may be unaware of many benefits the environment provides).

There are many instances where it is impossible to estimate the value of environmental goods and services based on market goods. In such non-market instances a contingent value survey (CVS) can be performed to ascertain a dollar value for the environmental good or service. A CVS is a survey that asks people hypothetical questions as to what they would be willing to pay for a change in an environmental attribute. It assumes that respondents have a thorough understanding of the good they are asked to value and that they will answer truthfully. There are many problems with the CVS method such as survey bias, possible irrelevance of hypothetical scenarios, lack of comprehensive understanding, and truthfulness in replies. The survey bias problem has to do with the way the survey questions are created, positioned and phrased. Some questions may be phrased in such a way that they lead respondents to certain answers. The ordering of questions could similarly be leading. Since the questions being asked involve hypothetical scenarios, the information obtained may not be a true reflection of the real value of the environmental attribute the survey was intended to value. For example, respondents may profess a positive willingness to pay for the 'feel good effect' that accompanies contributing to a social good, such as improved environmental quality. However, the survey may be structured in a way that the respondent finds unappealing, such as asserting that improved environmental quality will translate into a percentage increase in taxes. This proposed tax increase may be a true or false assumption on the part of the survey designer. The result could be that although the respondent values improved environmental quality, they may not be willing to pay for it because they are protesting a tax increase. Respondents are likely experienced in choosing between market goods, comparing physical goods in a market setting and choosing the preferred item. Thus, real life purchases are likely to accurately reflect respondents' true

willingness to pay. With CVS the respondents are given a fictional scenario and asked to make real world decisions as they would with market items. Respondents may not understand the scenarios they are presented with and therefore their answers may not be inline with their true willingness to pay. Lastly, respondent's answers to hypothetical questions may not be inline with their real world decision because they may not take the surveys seriously. If they see the survey as being irrelevant they may state their willingness to pay as being higher than it actually is. Conversely, if they see the survey as being directly related to them and possibly influencing their future expenditures, they will report a lower willingness to pay then their true beliefs. Some prefer the CVS method to market methods because it asks people directly about their preferences and demands for certain things, whereas market methods derive that value from other purchases. Though the CVS method is widely used, it is highly controversial for some of the reasons outlined above.

Another significant problem with the CBA is the use of the discount rate. The discount rate reflects that people prefer consumption today instead of consumption in the future. For example, if a person is given $10, they are likely to want to spend that $10 immediately to buy food, clothes, or whatever items they value. In order to persuade that person to delay their purchases until some time in the future, a monetary incentive must be offered. This incentive could be in the form of an interest rate that gives the person a reward for delaying consumption. For example, a 7% interest rate could be offered so that the person receives $0.70 after delaying their consumption for one week, giving them a total of $10.70 in one weeks time. This interest rate is called the discount rate. Likewise it is assumed that the promise of $10 in the future is worth only $9.30 today. The discount rate is named such because it actually discounts the value of future dollars into present day values. The assumption that current consumption is preferable to future consumption is based on the belief that through investments, one can increase the amount of currently available resources to yield a greater amount of resources in the future. For instance, if you have $100 today you could invest it in the stock market or real estate and providing you do well you could double your money in a year. If you hold off consumption and put the $100 in a savings account or stashed it under your mattress you would earn a significantly smaller or zero return on your investment. This may be sensible logic in typical scenarios, but the environment is not so straightforward. In an environmental scenario the discount rate would maintain that funds to solve and environmental problem, such as global warming where costs are uncertain, are better off being invested into high yield projects that will deliver future generations an increased amount of capital. This greater level of capital will enable future generations to more successfully address any environmental problems that arise. Perhaps new technology is developed to address environmental problems or the problem is discovered to be less troublesome and therefore less costly than originally expected. The discount rate dictates that future generations will be better off with increased levels of capital as opposed to reduced capital in order to inefficiently address an environmental issue.

There are several problems with the discount rate when applied to decisions regarding the environment. First, the rate used as the discount rate can drastically change how the benefits of a project are viewed. Lower discount rates favor projects with the highest net benefits regardless of when those benefits are realized. Higher discount rates favor projects that deliver benefits immediately as opposed to sometime in the future.

For instance, say the government is faced with a choice between two projects of equal cost in which to invest their money. Project A aims to reduce greenhouse gas emissions, delivering significant environmental and health benefits after 5 years. Project B involves an effort to educate consumers about identity theft, which will deliver the bulk of its benefits within one year. The choice of discount rate will affect the calculation of net benefits on the CBA. If a high discount rate is applied, project B with the short-term benefits will be chosen. If a low discount rate is applied, project A with the long-term benefits will be chosen. Determining the appropriate discount rate to use is one of the most controversial aspects of CBA. While a detailed discussion of how discount rates are determined is beyond the scope of this chapter a limited summary is included. The discount rate can be based on various market interest rates. For example, the discount rate can be based on the U.S. Treasury note rate, the rate on a 10-year Treasury Inflation Protected Security, or rates recommended by different government agencies. The Congressional Budget Office recommends a discount rate of 2%[17], which is based on the Treasury rate. The White House's Office of Management and Budget uses a discount rate of 7%, which is based on the rate of return on private investment[18].

Obviously, CBAs that use the Congressional discount rate will not be biased against projects with delayed benefits, whereas the White House's discount rate will favor projects with short-term benefits. This is problematic because many environmental programs have delayed benefits. This presents two major problems, namely the issue of intergenerational equity and incorrect assumptions about perfect substitutability. Intergenerational equity concerns the fairness with how the actions of current generations will impact the well being of future generations. The discount rate will always reflect a bias towards current generations and could possibly lead to extremely negative impacts for future generations. For example, a program to reduce carbon in order to curb global warming may be seen as inefficient by a CBA using almost any discount rate, because current generations will incur all the costs while future generations will reap all the benefits. Since the discount rate dictates that consumption by current generations is more valuable than consumption for future generations, the CBA would likely not favor this program. This is problematic because global warming could severely impact future generations causing them significant costs related to infrastructure loss, floods and droughts, unstable weather, unaffordable insurance, and the like. Moreover, the global warming problem is one that cannot quickly be solved, so that a delay in abatement measures could result in the problem being substantially more difficult and expensive to address or perhaps even impossible to curtail. The CBA on the carbon reduction program certainly does not consider the additional costs facing future generations associated with aggravated climate change, or the exponential costs related to solving a problem of global proportions that has grown unchecked. In this environmental scenario the CBA is distorted and biased towards current generations. It could even be said that the rights of current generations could be inflicting upon the rights of future generations.

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[17] Congressional Budget Office Website – "The Economic Effects of Federal Spending in Infrastructure and Other Investments" (June 1998) - located at http://www.cbo.gov/showdoc.cfm?index=601&sequence=0 accessed on May 18, 2006

[18] White House Website – Memorandum for Heads of Executive Departments and Establishments – Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs" (Oct. 29th 1992), located at http://www.whitehouse.gov/omb/circulars/a094/a094.html#8 accessed on May 18, 2006

Assumptions about perfect substitutability that are inherent in CBAs and the discount rate are erroneous with respect to many environmental scenarios. Perfect substitutability assumes that man made goods can be perfectly interchanged with or substituted for environmental goods and services. Poor substitutability recognizes that for some environmental attributes, there are not efficient man made alternatives. For example, perfect substitutability maintains that if a rain forest is destroyed, man is creative enough to find substitutes for the goods or services that rain forest once provided. Poor substitutability asserts that the rain forest may contain features such as rare plant species with curative properties, endangered animal species, low-cost carbon sinks and zero cost air purification systems that may be impossible or cost prohibitive for humans to replicate. A CBA may find that the rain forest destruction project increases social welfare because it yields low cost lumber and property to be developed. However, this CBA does not account for the environmental attributes that will be lost that cannot be replaced. In addition, the loss of the rainforest could cause exponential costs such as topsoil erosion, soil instability leading to mudslides, exacerbation of global warming and deteriorating conditions that could prevent the rainforest from ever recovering. CBAs and the discount rate assume that any damage done today to natural capital can be reversed. This is an incorrect assumption because efforts to replace or abate certain environmental goods or issues may be impractical, temporally inefficient or infeasible. It may be impractical in the future to use man made methods to purify air or water once nature's capacity to do so is overwhelmed. The reality is that fresh air and water are public goods that no private entity will produce; because it will be impossible gain a profit from producing these goods. If nature's ability to produce these pubic goods becomes overwhelmed, man will have to provide these necessities at a considerable cost. The government will have to subsidize air and water purification companies, which will be financed through considerable tax increases. CBAs and perfect substitutability do not take the reality of public goods into consideration. Similarly, if global warming is not dealt with in the present we may be faced with a situation in the future where the problem will take hundreds of years to correct itself because a tipping point has been crossed. If certain habitats or species are lost due to climate or development related extinction, it may be impossible to ever get them back. The CBA and the discount rate argue that it is better for future generations that current generations consume. This is because funds can be invested to yield greater amounts in the future so that future generations will be better of economically. This increase in economic welfare will allow future generations to deal with any problems related to the consumption patterns of past generations. Perfect substitutability assumptions flaw this rationale, as does the belief that economic prosperity is the only precursor for societal benefit.

There are many shortcomings or biases with respect to the benefits and costs calculated in a CBA. Many environmental externalities are not calculated as costs while many environmental services are not tabulated as benefits. For example, perhaps the government is trying to decide whether a project to build a new road will yield net social benefits. The road project will destroy 50 acres of forest while opening up rural land for economic development. The CBA will calculate the costs associated with the construction of the road and will determine a cost for the loss of forest land. The CBA will consider the many benefits that will arise because of the 'multiplier effect' of the road. This effect accounts for the many new businesses that will result as the new road

encourages traffic and commerce to the area. Gas stations, restaurants, shops, markets, developments, and the like will flourish as this new road opens up access to a previously remote area. Somewhat less comprehensively the CBA will not include the environmental externalities that result from this new road. These environmental costs would include the increase in greenhouse gases from the influx of traffic and liberation of carbon, the decreased ability to process these gases (as 50 acres of forest is destroyed), and the further loss of natural capital and environmental quality that occurs as the area becomes open to development. All these environment costs are only accounted for in the initial cost of the 50-forested acres of land. Another example of these calculation biases can be illustrated through an air quality improvement project. Perhaps the government is trying to consider the effect a program aimed at forcing polluting industries to incrementally reduce their pollutant emissions. The costs will include the burden on industry and increase in regulatory enforcement and oversight costs. The benefits will attempt to calculate how the incremental decrease in pollution will affect human health and mortality. However, will the benefits also include the reduction in climate altering pollutants or the improved crop yield that regional farmers may experience from a decrease in the acidity of the rain? CBAs seem to display a bias against calculating environmental externalities and indirect environmental benefits and bias towards calculating direct economic attributes. This is mostly a practical issue concerning the difficulty in identifying and quantifying environmental costs and benefits. Environmental externalities and indirect benefits are much more difficult to identify (especially by economists who have no scientific or environmental backgrounds) and are even harder to attach a dollar value to. As a result the costs and benefits related to environmental attributes are usually underrepresented.

The last major criticism of CBAs, with respect to the environment, is that for the most part they ignore that the public tends to be adverse to risk. Many assumptions made about non-market valuation, the discount rate, substitutability and CBAs are inherently incomplete in their ability to capture comprehensive environmental scenarios. This is perhaps because the environment is not static and straightforward like the operations of a factory, engineering of a car, or administration of an education program, for which CBAs may offer accurate information. The environment is dynamic and interwoven within its many features, furthermore its well being is vital to supporting human life. Decisions based upon these tools, in their current form, cannot account for all the benefits the environment provides nor all the costs that could result from disturbing the delicate balance of natural systems. It is well known that CBAs have limitations with respect to environmental attributes. Miscalculation of the benefits or costs associated with environmental capital could result in unintended and catastrophic losses to society. The uncertainty on which the CBA decisions are based upon burdens the public with an enormous amount of risk. This is a major flaw with CBAs because the public dislikes risks. The majority of the public prefers stability and predictability, with a smaller minority of the population deriving utility from risk. Since CBAs are used to identify actions that increase societal welfare, it is counterintuitive that they do not correct for the distortions related to environmental attributes. One way to do this would be to use weights. Weights are sometimes used in CBAs to give greater value to benefits received by low-income populations. In this way, weights act as a distributing tool since demand is usually derived by willingness to pay and these populations have a diminished ability

to pay, yet still have a demand for benefits. In these scenarios weights can help benefits and costs be distributed equally across the nation. If environmental attributes were given greater weights their benefits and costs could be viewed as greater than the current limited measurements indicate. Using a predetermined level of weights that are dependent on the environmental attribute in question could eliminate some guesswork as to the impacts of environmentally related decisions. Instead of leaving it to the economist to ponder and quantify every possible cost and benefit that results from a decision affecting the environment, weights could be used to indicate the value of the costs and benefits of that environmental attribute. This could more accurately account for the public's aversion to risk and ensure that environmental decisions are based upon long-term sustainability rather than short-term economic gain.

A Constitutional environmental right could reform many cost benefit analysis methods that undervalue the environment. A special form of cost benefit analysis can be developed that incorporates a low discount rate and higher weights attached to environmental benefits and costs. In this sense, economists would quantify environmental services through existing valuation techniques, but greater weights would be applied to reflect the fact that these valuation techniques are limited in their ability to account for the breadth of benefits the environment provides or the exponential costs that occur as a result of its degradation. Perfect substitutability would not be assumed in environmental CBAs and corrective measures and enhanced costs would have to be attached to this exclusion. These corrections would help CBAs arrive at a more accurate conclusion with respect to the environment. They would also take into account that the public is adverse to risk and values the low cost and stable services that a healthy environment provides.

Globalization

Globalization is the interconnection and integration of different national and region markets resulting in one large global market. Although the globalization movement began during America's Industrial Revolution, the global commitment to free trade has been the single most important factor in the rise of globalization. Free trade is the elimination of all economic barriers to trade, namely taxes and tariffs that increase the price of importing or exporting goods. The World Trade Organization (WTO) came into effect in 1995, adopting many of the trade liberalizing principles of its predecessor, the General Agreement on Tariffs and Trade (GATT). The WTO aims to increase trade by lowering trade barriers and settling trade related disputes between their 150 member nations. Free trade is sought as a way to stimulate economic growth in all areas of the globe. This is based on economic assumptions that maintain free trade will avoid efficiency losses associated with protection, encourage economies of scale, add incentives for the business-minded to create innovative ways to compete with imports, and eventually improve environmental conditions as poorer nations gain wealth and develop a demand for environmental protection (illustrated by the environmental Kuznet's Curve). The idea of free trade has many critics that argue; economic prosperity is only realized by the wealthy minority, it allows rich countries to exploit poorer countries for economic gain, it is biased towards multinational corporations, biased against small countries, and that it is harmful to the environment. A complete discussion of the advantages and disadvantages of free trade is beyond the scope of this chapter, but

several issues will be briefly summarized. What is of importance is the effect that free trade and globalization have had on the economy and how this affects the environment. Globalization affects the economy by increasing consumer consumption patterns, affects the environment by increasing dependence on transportation and can loosen environmental practices in foreign countries.

Human demand outpaced the biosphere's regenerative capacity by 120% in 1999[19]. Industrialized countries, particularly the United States, are responsible for creating this burden. Current consumption patterns in the United States are environmentally unsustainable. The graph below shows how although the United States has the smallest population, it has by far the largest ecological footprint:

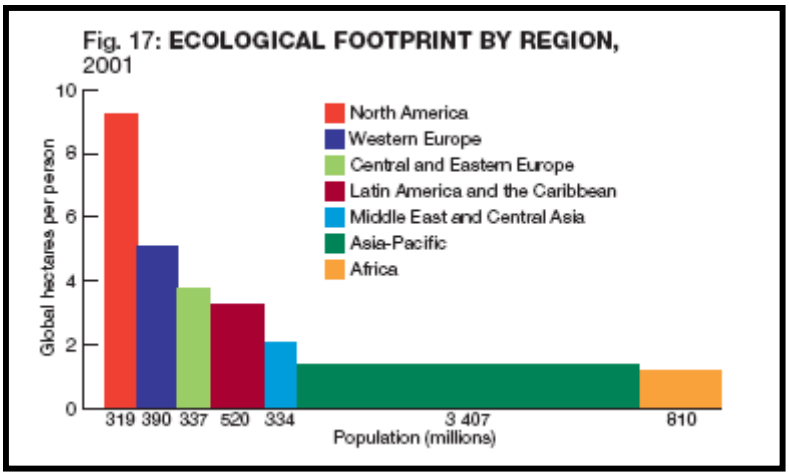

*Figure 17, taken from the World Wildlife Fund's Living Planet Report (2004)[20]

An ecological footprint is a measure of human natural resource consumption and the ability of nature to regenerate those resources. The overuse of natural resources in the United States is related to a culture of consumer consumption that drives people to buy more than they need. This mass consumerism phenomenon uses natural resources, creates excess waste and perpetuates the cycle of consumerism. Richard Robbins traces the mass consumerism movement to the industrial revolution when new production methods allowed goods to be produced easily[21]. He believes that this created an oversupply of products, which the population at the time did not have a demand for[22]. In response to this excess supply crisis, Robbins states that society began to convince people that they needed to buy things[23]. Commercial techniques such as advertising, promotions and marketing became popular in this time, all which contributed to the early commercializing of American society.

The industrial revolution's mass consumerism movement has evolved into globalization's 'excess consumerism' trend, which has more severe and far-reaching

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[19] Wackernagel et al, "Tracking the ecological overshoot of the human economy", PNAS, Vol. 99, No. 14, July 9, 2002, p.9266-9271

[20] World Wildlife Fund Website – "Living Planet Report:2004", p. 10, located at http://assets.panda.org/downloads/lpr2004.pdf accessed on May 18, 2006

[21] Robbins R, *Global Problems and the Culture of Capitalism*, Allyn and Bacon, 1999, p.210

[22] IBID, Robbins

[23] IBID, Robbins

environmental impacts. Globalization has exacerbated the consumption problem exponentially by enabling businesses to take advantage of cheap foreign labor and making foreign investment look more attractive. These factors have led to a dramatic decline in the price of goods, which has led to the "excess consumption" phenomenon[24]. Cheap foreign labor and global capital mobility allows businesses to produce goods at very low costs, translating into lower prices for the consumer. Lower product prices enable the consumer to buy more goods. At face value this could be seen as a very good thing. It could allow consumers to save more money, increase the standard of living, and perhaps increase environmental protection. The globalization movement has not bolstered any of these positive claims in America. Americans are actually among the developed world's worst savers! A survey by ACNielsen found that 22% of Americans have no money left to save once their essential living expenses are paid and discretionary dollars are spent[25]. In comparison only 3% of residents in Thailand and 13% of German residents are not able to save[26]. The report identifies that Americans are 'legendary for incurring debt', which could explain this decreased ability to save[27].

In her book, The Overspent American, Harvard Economist Julie Schor theorizes that Americans are engaged in wasteful over consumption patterns rooted in competitive emulation purchases. This competitive emulation is a form of 'keeping up with the Jones' that has been shaped by the domination of media, advertising and branding in American culture[28]. Schor believes the problem is partially because the gap between the rich and poor is widening[29]. The extremely wealthy who display exorbitant spending habits are highly visible in America. Schor feels that the poor population emulates the rich and aspire to similarly outrageous spending habits, perhaps causing them to consume more then they need[30]. Perhaps this is why Americans are so famous for their ability to incur debt and the reason why 22% of Americans are not able to save money. Material preoccupation and over consumption has also been linked to greater risk of depression and social pathology and a decreased ability to lead a happy life[31]. This leads to an important disconnect, globalization is supposed to promote economic growth, which increases the standard of living and supposedly allows people to live happier lives. However, evidence suggests that quality of life may be decreasing at the expense of economic growth. People may be able to buy more, but they seem to be less satisfied. David G. Myers, PhD states that compared to people in 1957 today's population is twice as rich but only slightly less happy, and has a tenfold increase in the incidence of depression[32]. The conclusion is that perhaps economic growth and materialism does not

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[24] Schor JB, " Prices and Quantities: Unsustainable consumption and the global economy", Ecological Economics, Vol. 55, 2005, p.309-320

[25] CNN Money Website - Christie L, "Americas: world's worst savers", Jan 26th 2006, located at http://money.cnn.com/2006/01/24/pf/worst_savers/index.htm accessed on May 19, 2006

[26] IBID, CNN Money Website

[27] IBID, CNN Money Website

[28] Schor JB, *The Overspent American: Upscaling, Downshifting and the New Consumer*, Basic Books, 1998

[29] IBID, Schor

[30] IBID, Schor

[31] DeAngelis T, "Consumerism and its Discontents", Monitor on Psychology, Vol. 35, No. 6, June 2004, p. 52

[32] Myers DG, "Does economic Growth Improve Human Morale?", located at http://www.newdream.org/newsletter/growth.php accessed on May 19, 2006

translate into enhanced well being for a developed country. Certainly for impoverished developing countries, that are unable to feed their populations, economic growth would enhance well being. The question remains, is there a threshold level of wealth for a society where the returns of each unit of economic growth begin to diminish, or perhaps the costs of economic growth outweigh the benefits? This point is related to the 'threshold hypothesis', which will be discussed later.

The environmental impacts of globalization add significant doubts to the rosy promises of free trade. Globalization has led to the increased production of goods, all of which have environmental impacts. More goods produced means more resources used, more pollution emitted and more wastes to eventually deal with. Some products like computers and electronics are significantly more toxic and energy intensive, while other commodities, like produce, are seemingly innocuous. There are several issues to examine with respect to globalization and the environment, namely transportation/distribution, environmental regulation, product cycles, and species loss[33]. Globalization dictates that production facilities will be located in areas that have low cost labor. These areas are usually located far away from the consumer market where the final goods will be sold. This requires distribution methods that are fossil fuel dependent to transport raw materials, intermediate goods, or final goods to their destinations. Before free trade, goods were often produced locally, which was far less energy intensive. Globalization has also led to the increase in the size of production in order to achieve the efficiency of economies of scale. These industrialized production methods are extremely energy intensive. Globalization has caused a massive surge in the use of energy, as the developing world is now adopting the energy wasting industrialization models of the developed world[34]. This increase in energy use is causing a depletion of energy resources, increased competition for energy resources (which increases the price of energy), and an increase in pollution related to energy production and use. This augmented dependence on transportation exacerbates global environmental problems such as climate change and ozone layer depletion. Local environmental problems also occur such as local air pollution, noise annoyance, intrusion of landscapes, congestion and high fatality rates[35].

Environmental regulation comes at a cost for polluting industries. Globalization allows pollution intensive industries to move to areas where environmental regulations are less strict and cost savings can be realized. Take the advice of Lawrence Summers, the one time Chief Economist for the World Bank, in his highly publicized memo advocating the exportation of polluting industries to poor under-regulated areas:

> DATE: December 12, 1991
> TO: Distribution
> FR: Lawrence H. Summers
> Subject: GEP

[33] Ehrenfeld D, "The Environmental Limits to Globalization", Conservation Biology, Vol. 19, No. 2, April 2005, p. 318-326
[34] IBID, Ehrenfeld
[35] Veen-Groot D.B., Nijkamp P., "Globalization, transport and the environment: new perspectives for ecological economics", Ecological Economics, Vol. 31, 1999, p.331-346

> 'Dirty' Industries: Just between you and me, shouldn't the World Bank be encouraging MORE migration of the dirty industries to the LDCs [Less Developed Countries]? I can think of three reasons:
>
> 1) The measurements of the costs of health impairing pollution depends on the foregone earnings from increased morbidity and mortality. From this point of view a given amount of health impairing pollution should be done in the country with the lowest cost, which will be the country with the lowest wages. I think the economic logic behind dumping a load of toxic waste in the lowest wage country is impeccable and we should face up to that.
>
> 2) The costs of pollution are likely to be non-linear as the initial increments of pollution probably have very low cost. I've always though that under-populated countries in Africa are vastly UNDER-polluted, their air quality is probably vastly inefficiently low compared to Los Angeles or Mexico City. Only the lamentable facts that so much pollution is generated by non-tradable industries (transport, electrical generation) and that the unit transport costs of solid waste are so high prevent world welfare enhancing trade in air pollution and waste.
>
> 3) The demand for a clean environment for aesthetic and health reasons is likely to have very high income elasticity. The concern over an agent that causes a one in a million change in the odds of prostrate cancer is obviously going to be much higher in a country where people survive to get prostrate cancer than in a country where under 5 mortality is 200 per thousand. Also, much of the concern over industrial atmosphere discharge is about visibility impairing particulates. These discharges may have very little direct health impact. Clearly trade in goods that embody aesthetic pollution concerns could be welfare enhancing. While production is mobile the consumption of pretty air is a non-tradable.[36]

In this sense globalization has allowed and encouraged pollution to spread to poorer countries. Additionally, free trade policies prohibit certain environmental restrictions. For example, imagine that the United States wanted to institute a mandatory environmental labeling program for all products sold domestically, as a way to inform consumers about the environmental impacts of the products. The WTO would object to this mandate on the grounds that it is a barrier to trade that forces other countries to incur an added cost in order to sell a product in the American market. In fact, the WTO can declare the law of any nation invalid or impose significant sanctions upon that nation if those laws are deemed to negatively affect trade. For example, the WTO has forced the U.S. to weaken parts of the Clean Air Act and the Marine Mammal Protection Act to make these laws fairer for foreign exporters. Since the WTO is tasked to keep barriers to trade at a minimum, it tends to be an advocate for multinational corporations who are dependent on liberalized trade. In effect, globalization transfers economic and political power away from a nation's citizens towards multinational corporations and the institutions that serve them, mainly the WTO[37].

There are less visible environmental problems related to free trade. Product cycles, the useful life of products, could also be affected by globalization. Low prices of goods can lead to a 'disposable' culture where products are often discarded rather than repaired. This is apparent in products that are technology intensive such as electronics and computers. Labor intensive products such as garments also display this disposable nature as fashion cycles are becoming more rapid and discard rates of these items are

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[36] Wikipedia Website – 'Summers Memo', located at http://en.wikipedia.org/wiki/Summers_memo accessed on May 19, 2006

[37] Mander j, Cavanagh J, "WTO feeds corporate greed", USA Today, December 2, 1999, A1

relatively high[38]. Devaluing goods because they are artificially cheap and can be easily replaced has significant environmental impacts. This practice increases the amount of waste and poorly utilizes the resources used to make the product. Wildlife and agricultural species loss is another environmental problem associated with globalization. Worldwide, many unique agricultural species are not being planted in favor of using only a limited number of high yield seeds, fertilizer and pesticide use is dramatically increasing, and aquaculture fisheries are being over farmed so much that marine ecosystems are suffering[39]. These agricultural impacts are a result of attempts to increase production output. Similarly, many species of wildlife are being affected or destroyed as once pristine lands are being utilized for resources, development or production facilities.

Free trade supporters tout globalization as a way to increase the standard of living for the entire world by promoting economic growth. Environmentalists cite the United Nations' findings that globalization is not creating a wealthier world, the gap between the rich and the poor is actually widening[40]. This study found that in 1960, the difference between per capita income of the richest and poorest countries was 3:1 and in 1997 that ratio was 74:1, it was also found that this trend is prevalent in income distributions within countries[41]. This indicates that economic growth may be realized for some, but not all, and sometimes at the expense of others. An example is that American CEOs are paid over 419 times more than production workers, while U.S. real median hourly wages are down 10% in the past 25 years[42]. In fact, of all high-income nations, the U.S. has the most unequal distribution of income, with 30% of income in the hands of 10% of the richest people and only 1.8% of income in the hands of the poorest 10% of people[43]. Nancy Birdsall believes that globalization will not increase the standards of living for those in developing countries either, maintaining that the wealthy minority will get richer and the poor majority will stagnate or get poorer[44]. She presents three reasons explaining why globalization is not delivering on its promises to increase global societal welfare. Birdsall states that economic gains from deeper and more efficient markets are not distributed equally, global markets do not behave as perfectly as their theoretical models suggest, and global markets tend to be dis-equalizing because they naturally reflect the greater market power of the rich[45].

Free trade advocates also believe that the environment will benefit because resources will be used more efficiently and the demand for environmental quality will increase as standards of living are achieved. Environmentalists disagree, believing that global and local environmental problems are worsened in pursuit of uninhibited

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[38] Schor JB, " Prices and Quantities: Unsustainable consumption and the global economy", Ecological Economics, Vol. 55, 2005, p.309-320

[39] Ehrenfeld D, "The Environmental Limits to Globalization", Conservation Biology, Vol. 19, No. 2, April 2005, p. 318-326

[40] United Nations Industrial Development Organization Website – "Globalization gap brows between rich and poor (press release), Nov 1999, located at http://www.unido.org/doc/4027 accessed on May 22, 2006

[41] IBID, UNIDO Website

[42] Mander J, Cavanagh J, "WTO feeds corporate greed", USA Today, December 2, 1999, A1

[43] World Watch Organization – Rich-Poor Gap Growing, *Vital Signs 2003*, pp.88-89

[44] Global Policy Forum Website – "Globalization Will Increase Inequality in Developing Countries", Feb 28th 2006, excerpts from Nancy Birdsall's lecture to the World Institute for Development Economic Research, located at http://www.globalpolicy.org/socecon/inequal/2006/0228incrinequ.htm accessed on May 22, 2006

[45] IBID, Birdsall

economic growth. Some evidence suggests that local environmental conditions may improve in developing countries as economic growth advances[46]. The exporting of wastes from developed countries to developing countries, which spawned the creation of the Basel Convention, offers dispute the claim the globalization improves local environmental conditions. Other evidence indicates that global environmental problems (climate change, ozone depletion, excess consumption) are likely to get worse as each country acts in its own self-interest. Karr and Thomas dispute that economic growth will lead to improved environmental quality, noting that economists usually have a narrow view of environmental quality[47]. These economists measure environmental quality by expenditures on pollution control, exposure to ecological risk and trends in human health indicators instead of attempting to measure overall environmental quality. This limited regional approach results in an incomplete perspective of overall environmental well-being, one that excludes global problems such as climate change or biodiversity loss. Although some argue that globalization will allow developing countries to achieve an economic standard of living that will enable them to pursue increased environmental protection, this opinion is flawed with respect to global environmental quality. Karr and Thomas believe that improved environmental quality can be reached faster and more efficiently with well-planned environmental education programs, information dissemination and appropriate technology[48].

Clearly, globalization has its benefits and its costs, socially and environmentally. The pursuit of economic growth, via liberalized free trade, has had many negative consequences that have not been compensated for. Increasingly, it seems like the rich minority and perhaps certain local environmental conditions stand to benefit from globalization, while the impoverished majority, unfortunate local environmental conditions, and the global environment bear the costs. Although a Constitutional environmental right would not directly effect the environmental injustices that are occurring as a result of globalization, it could indirectly effect them. A Constitutional environmental right could change the mindset and political climate in America, which could translate into the nation ratifying important international environmental agreements such as the Kyoto Protocol or the Basel Convention. By instituting such a right in the United States many domestically run companies would be incentivized to improve their environmental performance. This could result in better domestic and foreign environmental outcomes if the companies export goods or services. Since the Unites States is considered the major world power, implementing an environmental right domestically could send a powerful signal to the rest of the world. Perhaps other nations would follow the lead of the U.S. an institute similar rights, or perhaps foreign environmental practices would improve in an effort to adapt to the evolving environmental demands of the American market.

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[46] See Kuznet's Curve, or Ruud A, "Environmental Management of Transnational Corporations in India – Are TNCs Creating Islands of Environmental Excellence in a Sea of Dirt?", Business Strategy and the Environment, Vol. 11, 2002, p.103-118

[47] Karr J & Thomas T, "Economics, Ecology, and Environmental Quality", Ecological Applications, Vol. 6, No.1, Feb 1996, p.31-32

[48] IBID, Karr & Thomas, p.32

Gross Domestic Product

The Gross Domestic Product (GDP) is the total market value of all final goods and services produced in a country in a given year. This includes consumer, business and residential investment and government spending, plus the value of all exports, subtracted by the value of all imports. It is a statistical number that reflects the total output (national product) of the U.S. economy. It includes sale prices of final goods, but excludes factor of production. For example, the wheat to make bread is excluded from the GDP, but bread as a final good is included. The GDP is measured on a quarterly basis in current and inflation adjusted dollars, so as to easily compare real dollar values between time periods. The GDP is often used as an indicator of a nation's overall standard of living, though this practice has its critics. GDP and standard of living are positively correlated in that the standard of living of a nation usually improves as the GDP rises. However GDP is only a procyclic indicator of standard of living, it is not a direct measurement. The GDP was originally developed as a tool to measure productivity during World War II. The GDP only measures the productivity of a nation, which is based on individual labor, business capital, raw materials, energy and technology. The GDP is used as an economic indicator to help determine how the economy is performing and is often used to shape monetary policy.

Nobel prize winning economist, Prof. John Hicks, realized in the 1940's that a rising GDP could not ensure that a country's new investments in infrastructure could compensate for the depreciation of the nation's physical capital. As a result a new economic indicator, the net national product (NNP), was conceived. The NNP is a measure of the total market value of all final goods and services produced by citizens of an economy per year, minus depreciation. Depreciation is the amount of money that must be spent to maintain existing physical goods and capital stock such as roads, bridges, etc. The NNP is important to show that needed investments are being accounted for so that the physical capital that future economic success is dependent on can be maintained. A consistent level of NNP is used as a precondition for maintaining increasing levels of economic activity. The NNP is used along with the GDP. Critics argue that the NNP was a necessary addition to the use of the GDP, however more changes are needed[49]. Their main argument is that the GDP fails to account for many important social and environmental assets.

According to The Economist, the GDP is the most commonly used measure of a nation's success, yet it is badly flawed guide to a country's well being[50]. Generally, an increasing GDP is seen as an indicator of economic success and viability. However, the GDP was never intended to measure economic health or well being. Using the GDP as an indicator of national well being would lead policymakers to believe that increasing monetary transactions equate to happiness and well being. To illustrate how this is an incorrect assumption, consider the following social and environmental criteria that the GDP fails to properly account for;

- **The GDP treats crime, divorce and natural disasters as economic gain**. This is because these events increase monetary transactions such as

[49] Darmstadter J, "Greening the GDP: Is it Desirable? Is it Feasible?", Resources, Issue 139, Spring 2000, p. 12

[50] The Economist Website – "Grossly distorted picture", Feb 9th 2006, located at http://www.economist.com/finance/displaystory.cfm?story_id=5504103 accessed on May 22, 2006

anti-crime investments, legal fees and expenditures related to rebuilding after natural disasters occur.

- **The GDP ignores the non-market economy of household and community**. Productivity in the home is not considered by the GDP. Therefore, services provided for by a babysitter are inputted into the GDP while services of parents are excluded.
- **The GDP treats the depletion of natural capital as income.** The destruction of a forest would not be seen as decreasing a nation's natural capital, instead it would value the timber as a final good or value the final products created by the timber.
- **The GDP increases with polluting activities and again with cleanups.** This method of calculation values inefficiency. Instead of valuing the prevention of pollution as being optimal, the GDP measures pollution and subsequent efforts to remedy that pollution as income generating.
- **The GDP takes no account of income distribution.** A rising GDP could indicate that the nation is getting wealthier. In actuality the gap between rich and poor could be growing, indicating that only a select few are benefiting from economic growth. In this sense the GDP is not a good indicator of overall social welfare.
- **The GDP ignores the negative aspects of living on foreign assets[51].** The GDP does not account for the negative impacts of the U.S. accumulating an unsustainable level of foreign debt. These negative aspects could include the devaluation of the dollar, skyrocketing interest rates, and an overall domestic economic crash that could severely effect many foreign economies.

The GDP fails as a measurement of national well being because it values many harmful social and environmental activities and devalues many beneficial activities.

In 1994, the Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce presented findings on how to adjust the GDP to include activities related to the environment, known as the Integrated Environmental and Economic Satellite Accounts. Congress subsequently prevented the BEA from carrying out their planned adjustments, in favor of an independent review of the findings by the National Research Council (NRC). In 1999, the NRC released their analysis of the BEA's work in a book entitled, *Nature's Numbers: Expanding the National Economic Accounts to Include the Environment (National Academy of Sciences Press, 1999)*. The NRC defines three principle environmental elements: nonrenewable assets, renewable assets and environmental quality[52]. The NRC notes that there are several challenges to calculating these environmental principles such as the many choices regarding how to appropriately determine a price for these elements, the quantities by which these prices are multiplied (which related to the uncertainty of potential resource reserves), and translating negative

[51] Redefining Progress Website – "What's Wrong with the GDP as a Measure of Progress", located at http://www.redefiningprogress.org/newprograms/sustIndi/gpi/whatswrong.shtml accessed on May 23, 2006

[52] Darmstadter J, "Greening the GDP: Is it Desirable? Is it Feasible?", Resources, Issue 139, Spring 2000, p. 13

environmental and social impacts into dollar metrics[53]. The NRC concluded that the GDP must be used as the dominant measure of economic productivity, but that smaller 'satellite' accounts should be developed as indicators of environmental and social impacts. The NRC confirmed that traditional measures of national income that are limited to market transactions distorts the indicator as a measure of economic activity and well being[54]. The NRC plans to develop a set of market and non-market satellite accounts that will measure the value of environmental and natural resources as well as social activities such as unpaid household work, leisure time, and informal education[55]. These accounts are to be used in conjunction with the GDP to reveal if the nation is using its natural resources in a sustainable manner, offer data about consumption patterns, and to understand how the nation is managing its environmental legacy[56].

As the NRC is struggling to develop smaller satellite indicators to value environmental and social impacts, larger indicators such as the Genuine Productivity Indicator (GPI) have already been developed. The GPI was conceived in 1995 by an organization called Redefining Progress. The GPI is based on its predecessor, the Index of Sustainable Economic Welfare (ISEW). The GPI includes all the same data as the traditional GDP, but accounts for several other factors such as income distribution, volunteer and household work, crime, and degradation and destruction of natural resources. A brief summary of how the GPI is calculated is included below;

Using personal consumption expenditures adjusted for income inequality as its base, the GPI then adds or subtracts categories of spending based on whether they enhance or detract from our nation's well-being.

The following nonmonetary benefits—ignored by the GDP—are included in the GPI:

1. the value of time spent on household work, parenting, and volunteer work;

2. the value of services of consumer durables (such as cars and refrigerators); and

3. services of highways and streets.

The GPI then subtracts three categories of expenses that do not improve well-being:

1. defensive expenditures, defined as money spent to maintain the household's level of comfort, security, or satisfaction, in the face of declines in quality of life due to such factors as crime, auto accidents, or pollution. Examples include personal water filters, locks or security systems, hospital bills from auto accidents, or the cost of repainting houses damaged by air pollution.

2. social costs, such as the cost of divorce, crime, or loss of leisure time.

3. the depreciation of environmental assets and natural resources, including loss of farmland, wetlands, and old-growth forests; reduction of stocks of natural resources, such as fossil fuels; and damaging effects of wastes and pollution.

[53] IBID, Darmstadter, p.13
[54] Nordhaus W, "Future Directions for Environmental and Augmented National Accounts", Resources, Issue 139, Spring 2000, p. 15
[55] IBID, Nordhaus

*The Genuine Progress Indicator 1950-2000 (2004 Update), p.8, located at http://www.rprogress.org/publications/gpi_march2004update.pdf

The GPI is an indicator that can help determine if a country's economic productivity growth is actually resulting in an improvement of overall social welfare. The impetus for the development of the GPI was the 'threshold hypothesis', which maintains that when macroeconomic systems expand beyond a certain threshold size, the costs of additional growth outweigh the benefits[57]. A very basic economic 'law' can explain the theory behind the 'threshold hypothesis'; it is called the law of diminishing marginal returns. The 'law' of diminishing marginal returns states that in a production system that has fixed and variable inputs, keeping the fixed inputs constant, the more of a variable input is applied each additional unit of input yields less and less additional output. For example, a chicken farmer inputs bags of corn to feed his chickens (Table X). Initially, for every bag of corn he feeds the chickens per week (variable input) he gets a steady increase in the pounds of chicken outputted. The first bag yields a physical product of 14

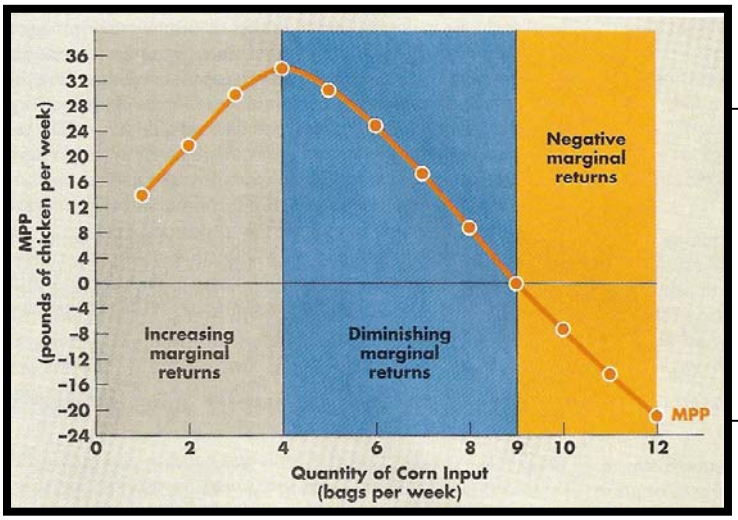

Table X
Source: Baumol WJ & Blinder AS, *Economics: Principles and Policy*, 7th Edition, 1998 update, The Dryden Press, Harcourt Brace & Company1998

lbs per week, the second bag adds 22lbs, the third adds 30 lbs, and the fourth adds 34 pounds, all of which are positive numbers. Eventually, at five bags of corn per week he notices that the rate of increase in pounds of chicken per week has actually decreased to 30 lbs again, the marginal physical product of the lbs of chicken per bag of corn is now lower then it was at four bags. This is shown in the blue section of the chart as the slope of the production curve becomes negative. The total physical production is still positive, but at a diminished rate. After the ninth bag of corn the chickens may become ill and production will become negative, meaning the farmer will loose money. The yellow section, where the production curve dips below zero and yields negative returns, represents this. The threshold hypothesis relates the 'law' of diminishing returns to the natural environment (fixed inputs), variable inputs of production and economic growth.

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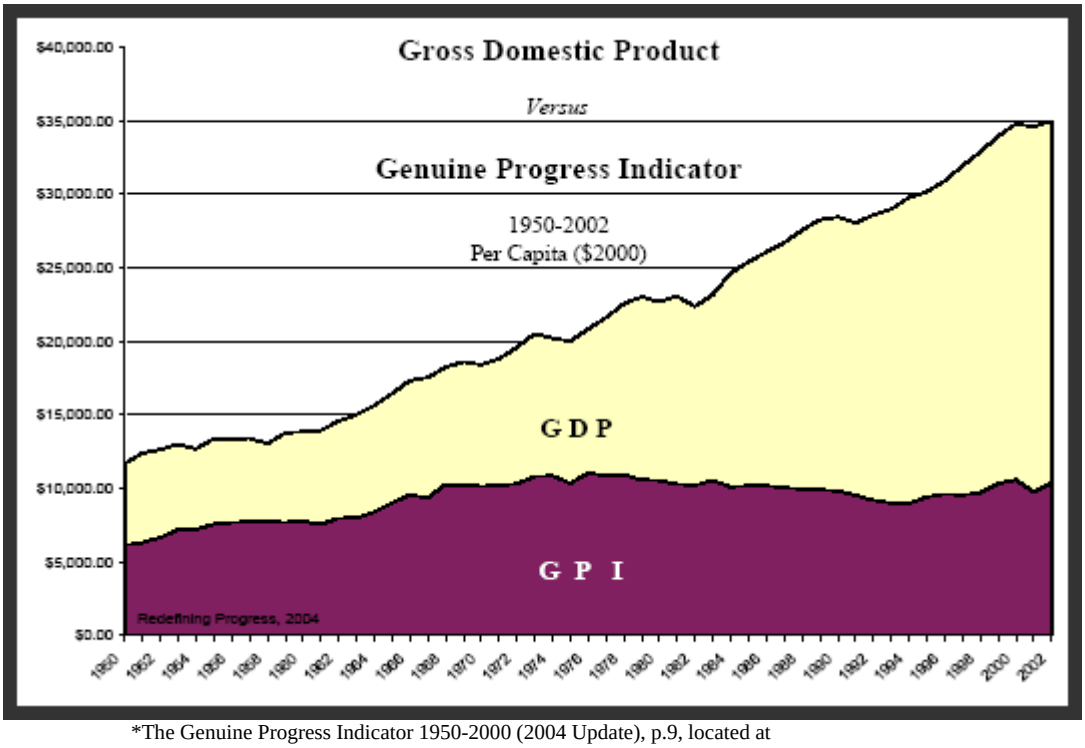
[56] IBID, Nordhaus

[57] Max-Neef M, "Economic growth and the quality of life", Ecological Economics, Vol. 15, 1995, p.115-188

It maintains that because the earth and its natural resources are fixed inputs, variable inputs to production will eventually yield diminished returns and after a threshold point, production will result in economic loss. This means that growth rates will be high at first, will eventually diminish and in the long run will become negative. We are no doubt in a period of diminishing returns, the question is not if we will hit the threshold point, but when.

Redefining Progress compared the different values yielded from the GDP and GPI from 2000 to 2003. The GDP showed that the economy grew 2.64% (about $272 billion), which translates into about $180 per American[58]. The GPI revealed a much smaller growth rate of only 0.12% in economic activity[59]. This includes a $212 per person decline, mostly related to the degradation of natural resources and the rise in national debt. The reduced growth rate also included an increase in GPI calculations of $600 billion related to volunteer and housework, which is not accounted for in the GDP. The disparity between the GDP and the GPI is not just present between 2000 and 2003 it is an historical pattern. Consider this graph comparing the GDP to the GPI from 1950 to 2003:



*The Genuine Progress Indicator 1950-2000 (2004 Update), p.9, located at http://www.rprogress.org/publications/gpi_march2004update.pdf

Even though the GDP is steadily and significantly increasing, the GPI indicates that societal well being is relatively flat or incrementally increasing.

[58] Venetoulis J, Cobb C, "The Genuine Progress Indicator 1950-2002 (2004 Update)", p. 8, located at http://www.rprogress.org/publications/gpi_march2004update.pdf accessed on May 23, 2006
[59] IBID, Venetoulis & Cobb

To illustrate how the GDP is an inappropriate indicator of environmental well being consider how it treats disasters as boosts to the economy. The Exxon Valdez oil spill, one of the worst ecological disasters at sea on record, was measured as a boost to the economy by the GDP. This is because it resulted in increased labor and capital expenditures to remediate the disaster. However, the significant loss of wildlife, wasted oil, pervasive ecological disruption and inconvenience to area residents was not accounted for. Similarly, the 2005 hurricane season (consisting of hurricanes Rita, Katrina and Wilma), which devastated New Orleans and other areas of the South, were tabulated as a huge economic boost for the country. Clearly, the GDP is distorted as a measure for environmental and societal well being. If the American government strove to enhance the GDP as a way to make citizens better off, they would be encouraging pollution and global environmental problems (such as global warming and ozone depletion) that increase the probability of extreme weather events. War could even be viewed as economically advantageous through the lens of the GDP. President Bush's ex-economic advisor, Larry Lindsey suggested, " The successful prosecution of the {Iraq} war would be good for the economy"[60]. Seeing as people tend to be risk averse, most Americans would probably prefer not to have family or friends be involved in fighting a war in Iraq. Again, this illustrates how solely using measurements of economic productivity, via the GDP, can grotesquely overestimate societal well being.

Indicators like the GPI have been used in many real world applications. The GPI Atlantic is a non-profit research organization in Nova Scotia that uses the GPI to measure sustainability, well being and quality of life. The government of Canada is also developing indicators modeled after the GPI to measure national well being. The Environment and Sustainable Development Indicators Initiative (ESDII) is a Canadian initiative to develop a set of indicators to track how Canada's current economic activities could affect the well being of future generations. ESDII works with six indicators to measure natural capital and national well being, these include; forest cover, freshwater quality, air quality, greenhouse gas emissions, extent of wetlands and educational attainment[61].

The Measure of Domestic Progress (MDP) is Britain's attempt to account for the comprehensive quality of the economy. The MDP attempts to reflect the progress in the quality of life experienced by its British citizens and the sustainability of the economy[62]. Factors such as environmental and social costs of economic growth are calculated as well as the benefits of unpaid household labor, all of which are excluded from traditional GDP measurements. The MDP figures indicate that over the last 50 years social progress has become increasingly separated from economic growth, stalling completely about 30 years ago and never regaining the peak reached in 1976[63]. Although the GDP has been soaring in the UK, the MDP has on average grown at less than half the rate of the GDP. Environmental costs have risen 300%, social costs have increased 600%, there has been a

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[60] MSNBC Website – "Cost of Iraq War Could Surpass $1 Trillion", Martin Wolk, March 17, 2006, located at http://www.msnbc.msn.com/id/11880954/ accessed on May 23, 2006

[61] National Round Table on the Environment and the Economy Website – Indicators, located at http://www.nrtee-trnee.ca/eng/programs/current_programs/SDIndicators/index.html accessed on May 25, 2006

[62] New Economics Foundation Website – "UK Budget: Social Progress Stagnant as GDP Soars", 3/16/2004, located at http://www.neweconomics.org/gen/news_mdp.aspx accessed on May 26, 2006

[63] IBID, New Economics Foundation

13-fold increase in the cost of crime and a four-fold increase in the cost of family breakdown[64].

The Organization for Economic Co-Operation and Development (OECD) is currently formulating a set of indicators to measure well being, in an ongoing effort coined the World Forum – Statistics, Policy & Knowledge. The OECD efforts are considerably less developed then the GPI or the efforts of the Canadian government. However, the OECD's World Forum represents a worldwide effort to improve the relationship between statistics and policy making by understanding such things as how to measure the progress and well being of a society[65]. So far the World Forum has consisted of one large conference in 2004 and periodic regional workshops, while a second World Forum Conference is being planned for 2007.

Perhaps one of the most telling examples of the difficulties in developing an economic indicator that can measure quality of growth along with quantity is China's attempt at developing a Green GDP. In 2004 the Chinese government began to work on criteria to develop a Green GDP index that would deduct environmental damage and resource consumption from the traditional GDP[66]. This Green GDP was seen as desirable by Xu Xianchun, director-general of the department of national accounts of the National Bureau of Statistics (NBS) of the Chinese government because, "China is facing the problem of over-consumption of resources in pursuit of rapid economic growth" and that this new indicator, "can help people understand the costs of resources and environment during the economic development, urging people to realize that it is unreasonable to purely seek economic growth while ignoring the importance of the resources and environment"[67]. In May of 2006, China abandoned its plans for the Green GDP index. An unnamed official at the NBS stated the reason for abandoning the Green GDP is that, "It is virtually impossible to calculate accurately a figure for GDP adjusted for the impact on the environment"[68]. China is now pursuing "green accounting" a method of tracking resources using flow charts that is endorsed by the United Nations.

The United Nations System of National Accounts (SNA) standardizes some of the methods used to calculate the GDP and other economic indicators. Regarding environmental valuation, the United Nations advocates a form of green accounting that they call Environmental Management Accounting (EMA). EMA is an accounting method that attempts to quantify the full spectrum of environmental costs of production processes and the benefits of pollution prevention[69]. These figures are then added to traditional accounting methods to yield calculations which day-to-day business decisions can be based upon. EMA is mostly used for companies, but can be used to measure

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[64] IBID, New Economics Foundation

[65] Organization for Economic Co-Operation and Development Website – About the OECD World Forum, located at http://www.oecd.org/document/57/0,2340,en_21571361_31938349_36043065_1_1_1_1,00.html accessed on May 25, 2006

[66] China Daily Website – "China plans to set up green GDP system in 3-5 years", Xinhua, 3/12/2004, located at http://www.chinadaily.com.cn/english/doc/2004-03/12/content_314332.htm accessed on May 26, 2006

[67] IBID, China Daily

[68] Euro2Day Website – "China abandons plan for green GDP index", Richard McGregor, 5/9/2006, located at http://www.euro2day.gr/articlesfna/13995880/ accessed on May 26, 2006

[69] United Nations Department of Economic and Social Affairs, Division for Sustainable Development Website – "Technology: Environmental Management Accounting Initiative", located at http://www.un.org/esa/sustdev/sdissues/technology/estema1.htm accessed on May 26, 2006

government agencies or departments. EMA typically focuses on environmentally related costs internal to a company and is used for decision making by management of for external reporting purposes[70]. Governments can use EMA in two ways; 1) in the operations of government departments and 2) by encouraging businesses to use EMA, thus allowing the government to achieve policy goals. EMA is a valuable tool for businesses and government, but is not an economic indicator (like the GPI or Green GDP) that can measure economy-wide social or environmental costs.

China abandoned its pursuit of a Green GDP because valuating non-market environmental services on a nationwide basis seemed too difficult. Why wouldn't China, or the United States for that matter utilize existing methods like the GPI in Canada or the UK's MDP, which have been implemented successfully? Why use EMA on an indirect basis instead of employing a nationwide indicator? Why are the OECD and the U.S. developing new indicators when successful methods have already been established? Philip Lawn suggests that the major criticism against the GPI and similar indicators is the lack of theoretical foundation supporting them, which relates directly to the valuation methods employed[71]. Lawn systematically reviewed the valuation methods used by these indicators. His results indicate that significant criticisms exist with the valuation techniques used to measure private consumption expenditure, index of distributional inequality/weighting of personal consumption expenditure, disservices generated by economic activity, defensive and rehabilitation expenditures, net producer goods investment, and cost of sacrificed natural capital services[72]. Lawn's findings also revealed that there is a considerable amount of inconsistency and subjectivity in these valuation techniques. Overall, Lawn suggests that there is a need for these indexes to develop a more robust and consistent set of valuation methods[73]. He notes that the acceptance of these welfare indicators by large, reputable professional and academic organizations will be instrumental in integrating them into government policymaking use[74].

A Constitutional environmental right could require that an environmental set of indicators be implemented and considered in tandem with the GDP, much like how the NNP is used. Of course there are many difficulties associated with the design and use of these environmental indicators, but the U.S. is presently developing environmental indicators and can look to the GPI and the UK's MDP as examples. It is difficult to believe that the indicators developed by the US will perfectly measure the well being of the environment. It is important to understand that a perfect environmental indicator can be developed overtime, in the absence of a perfect indicator, the best available alternative should be used so the relationship between economic growth and environmental well being can be understood and properly dealt with.

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[70] United Nations Division for Sustainable Development – "EMA Makes ene!!! – Measurement for Improved Environmental and Economic Performance: Environmental Management Accounting for Government", March 2003, located at http://www.un.org/esa/sustdev/publications/EMAGovernment.pdf accessed on May 26, 2006

[71] Lawn P, "An Assessment of the Valuation Methods Used to Calculate the Index of Sustainable Economic Welfare (ISEW), Genuine Progress Indicator (GPI) and the Sustainable Net Benefit Index (SNBI)", Environment, Development and Sustainability, Vol. 7, 2005, p.185-208

[72] IBID, Lawn, p. 185-208

[73] IBID, Lawn, p. 205

[74] IBID, Lawn, p. 206

Short-Term Thinking: Capitalism and Corporations

Capitalism is the socioeconomic system that governs the United States and many other nations around the world. Capitalism advocates the control of the 'means of production' of goods to those who invest money into the production process. These private investors contribute capital to the means of production in the hopes of achieving a profit. Capitalism advocates uninhibited markets, private ownership, and free enterprise as ways to achieving greater efficiency, increased opportunity, enhanced product quality and reduced product costs. As discussed in the beginning of the chapter, Adam Smith believed that free market capitalism and the individual pursuit of profits would result in benefits for all of society. The existence of externalities and limited resources offers disputes to Adam Smith's theory that social welfare will benefit from capitalism. Correspondingly, capitalism is often characterized by unequal distribution of wealth, intense competition and the pursuit of self-interest unencumbered by ethics, all of which maybe counterproductive to increasing overall social welfare. One reason is because capitalism may make some individuals better off through capital accumulation, perhaps at the expense of other individuals. Karl Marx, who believed that capitalism would result in a crisis, popularized this problem. Marx believed a crisis would result as the large population of working class (and a near non-existent middle class) confronts the small numbers of wealthy people who have accumulated the majority concentration of capital.

Many aspects of capitalism are harmful to the environment. One of the most damaging characteristics of capitalism is that it's foundation in self-interest leads to short-term thinking. Entities within a capitalist society will focus on maximizing profits for themselves, as a result society as a whole may or may not receive indirect benefits. However, it is almost certain that future generations are incurring large costs as a result of this short-term self-interested behavior. These costs are related to environmental damage and non-renewable resource use. This is because the creation of profits is energy intensive and leads to the destruction of the resources, accumulation of wastes and the degradation of the environment. Future generations will have to deal with these expensive and complex issues. Adam Smith and the early advocates of capitalism perhaps did not understand that population growth and increased self-interested behavior could lead to the reduction of available natural resources. Surely Adam Smith's theory did not envision that natural processes would be overwhelmed and not able to regenerate in the face of intense self-interested behavior. Nor could his theory account for the global environmental problems that result, such as the greenhouse effect through the burning of fossil fuels, climate change, reduction of carbon sinks via massive deforestation, acid rain, ozone layer depletion, desertification, top soil destruction from poor agricultural practices, or land and water pollution by industrial waste, pesticides and fertilizers. Environmental regulation is a market distortion in that it prevents the market from operating freely. Environmental regulations are put in place to protect the public from the actions of the self-interested polluters. As a result market prices, profits, labor wages and property rents are all affected by environmental regulations. These regulations help protect the public at large from the actions of the self-interested. The existence of environmental regulations is proof that self-interested actions of the capitalist will not always result in benefits for society as a whole.

Modern environmental thought is similarly flawed, though it understands that the government has limited financial resources it fails to properly value the services the environment provides. While Adam Smith was far removed from current environmental problems, modern day economics is entrenched in them. The failure to properly account and adjust for environmental realities is likely based in the difficulties associated with the task and the lack of value related to the public goods and services provided by the environment. Adam Smith's inability to account for the environmental effects of narrowly focused self-interested actions is likely due to ignorance about the situation. The omissions of modern day economics are far more purposeful and egregious.

Some believe that capitalism is ecologically unsustainable, that it can function in the short –term, but can not ultimately survive.[75] Andriana Vlachou believes that the sustainability of capitalism is uncertain, especially since it has several characteristics that are contradictory to ecological sustainability[76]. It is important to note that sustainability has many different definitions. The World Commission on Environment and Development defines sustainable development as development that meets the needs of present generations without compromising the ability of future generations to meet their own needs[77]. This definition of sustainability is already in conflict with capitalism, because capitalism is not about fulfilling needs, it is about accumulating capital. It values growth in all forms, whether it is needed or not. Vlachou uses a modified definition of sustainability in relation to capitalism. She asserts that capitalism is ecologically sustainable if it can secure the natural conditions and processes that are necessary for its existence[78]. This definition posits capitalisms ability to survive as the only measure of sustainability. This seems logical since without basic environmental conditions to support human life and labor capitalism would cease to have a society to exist within. Correspondingly, if capitalism depleted all the natural resources available it would have nothing left to base production on.

Vlachou identifies the three major contradictions that capitalism displays towards the environment[79]. Capitalists widely assume that science and technology will be able to address any ecological problems that arise. However, Vlachou notes that the development of science and technology is inseparably interwoven with capitalist motives and institutions[80]. As a result the economic and competitive aspects of capitalism may drive science and technology to develop solutions to one environmental problem that result in other environmental problems. Examples of this are numerous; the development of genetically modified foods to combat pest problems can result in many negative health effects for food consumers, the use of nuclear power to curb fossil fuel related global warming results in dangerous nuclear wastes with near endless life spans, the creation of

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[75] See Barkin D, "Sustainability: The Political Economy of Autonomous Development", Organization & Environment, Vol.11, No.1, 1998, p.5-32 ~and ~ Kovel J, "The Justifiers: A Critique of Julian Simon, Stephan Schmidheiny, and Paul Hawken on Capitalism and Nature', Capitalism, Nature and Socialism, Vol. 10, No. 3, 1999, p.3-36

[76] Vlachou A, "Capitalism and ecological sustainability: the shaping of environmental policies", Review of International Political Economy, Vol. 11, No. 5, December 2004, p. 926-952

[77] The World Commission on Environment and Development, *Our Common Future,* Oxford: Oxford University Press, 1987

[78] OpCit, Vlachou, p. 945

[79] IBID, Vlachou, p.926-952

[80] IBID, Vlachou, p. 945

DDT to combat agricultural pests created many negative health problems. The second point Vlachou notes is that environmental regulation and changes are interwoven with the processes of uneven capitalist development and growth[81]. This point illustrates how industrial entities will only favor environmental conservation if they can successfully develop related technologies that create markets to exploit[82]. This point also shows how the economic problems of developing nations, particularly their national debt, make environmental protection almost impossible. This is because there will be an incentive for these countries to accept environmental risks in exchange for monetary benefit. It is also likely that environmental regulations will be slow to develop because the country will want to limit these regulations to secure a competitive advantage over other strictly regulated nations. Related to her second point, Vlachou mentions that developed countries will experience public sector inefficiencies as a result of the contradictions between capitalism and the environment. Developed countries will have conflicting objectives to preserve the environment, ensure competitiveness and maintain the labor force. An example of this is how the government has handled the old-growth forests of the Northwest United States. Two divisions within the Department of Interior, the Fish and Wildlife Service and the Bureau of Land Management have been pitted against each other as the former is tasked to protect the area's endangered species (spotted owl, marbled murrelet) and the latter is concerned with the area's commercial log yield.

Vlachou's third assertion is that the working class may reject environmental regulations because it could result in wage reduction and job loss. This is because environmental regulations increase costs for the capitalist entity; these costs could be financed through reduction in worker wages or jobs. Capitalism is dependent on labor as a means of production. If the labor force objects to environmental protection because they are forced to bear the cost of environmental regulation, capitalism is likely to be contradictory with ecological sustainability. Vlachou observations indicate that the future of capitalism is uncertain. Capitalism may eventually be a cannibalistic system, doomed to implode on itself. It may be the very foundation of capitalism, which is rooted in short-term self-interest that is driving the destruction of the environment and possibly catabolizing itself. As Kirkpatrick Sale states, "To put it starkly, that {the market economy} means that the environmental movement can never win, can never be anything but a tolerated gadfly, as long as it functions within capitalist society."[83]

Short-term thinking by businesses and politicians also severely harms the environment (See the Government Chapter for more about political short term thinking). Short-term thinking causes these entities to pursue short-range goals that add immediate benefits, instead of long-term goals that are objectively more important. The 'tragedy of the commons' problem ensues as these individual entities exploit the environment for their own self-interest, but at the expense of the common good. Since there is limited focus on long-term sustainability, the ability of the rest of society to function in the future could be compromised by this short-termism. In March of 2006, United Nations Secretary General Kofi Annan stated that, "The world remains locked into short-term

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[81] IBID, Vlachou, p. 946

[82] Miyamoto K, 'Japanese Environmental Policies Since World War II", Capitalism, Nature and Socialism, Vol. 2, No.2, 1991, p. 71-100

[83] Sale K, "An Illusion of Progress", The Ecologist, July/August 2003, p. 24

thinking, from election cycles in politics to profit taking in the business world. Sustainable development cries out for a long-term perspective"[84].

A corporation is a business organization with a charter delineating it as a legal entity with rights, privileges, and liabilities distinct from its members. Corporations create economies of scale, which is akin to bulk purchasing power, and organize large numbers of people to produce goods and services more efficiently. Corporations can be privately held by a group of investors, or can be publicly held with shares of stock traded on equity markets (NYSE, NASDAQ). The goal of corporate capitalism is to maximize short-term private financial profits. Corporations operate on a quarterly basis where each quarter is three months. Business statistics allow corporate managers to track economic progress each quarter to track costs and revenues. Corporate quarterly performance affects the value of the company's stock in the stock market. Stock value and positive quarterly performance is important to a company because they must attract and retain investors to finance their operations and expansion. Poor quarterly performance can translate into exponential economic loss as revenues decrease, shareholders lose confidence and sell stock, and the ability to attract new investors is diminished. In order to survive as corporations and to achieve their basic goal, corporations must be entrenched in short-term thinking that ranges anywhere from the current financial quarter to at the most the next five years. According to Eduard Gracia, corporate short-term thinking has been pervasive over the past 30 years, stemming from an increasingly competitive economic system that forces participants to focus on winning in the short-term instead of long-term business survival[85]. Gracia mentions a 'winner-take-all' system where winners experience substantial payoffs and losers incur devastating losses, creating dramatic incentives to win the next round (quarter)[86].

Corporate short-term thinking can have significant effects on the environment. In order to maximize profits costs must be minimized. Most often environmental costs are externalized in the form of pollution. These costs are created by the private corporation, but borne by the public at large. This enables the corporation to reap the benefits of the products they produce but not pay the costs associated with the pollution created. Since maximizing private profits is the goal of the corporation, maximizing public costs is appropriate, especially when these costs are relatively hidden. Similarly, corporations are not concerned with the long-term life of natural resources. Since they want to minimize short term costs they will choose the method of resource extraction that will yield the largest benefit at the smallest cost, irrespective of long term sustainability. For example, clear cutting a forest is the cheapest way to deliver the largest benefit, however that forest will recover much slower and no longer provide timber resources. Selective cutting would be the preferred method of resource extraction to deliver the best mix of sustainability and resource, but this option is considerably more costly and delivers a reduced short-term benefit. Corporate agricultural practices are geared towards high

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[84] United Nations Environment Programme Website – "Kofi Annan Honoured with Zayed Prize for the Environment", 2/6/2006, located at http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=470&ArticleID=5136&l=en accessed on May 26, 2006

[85] Gracia E, "Corporate Short-Term Thinking And The Winner Take All Market", Business Quest: A Journal of Applied Topics in Business and Economics, Research 2004, located at http://www.westga.edu/~bquest/2004/thinking.htm accessed on May 26, 2006

[86] IBID, Gracia

short-term production yield. As such, they employ vast amounts of fertilizers and pesticides, as well as harvesting techniques that destroy topsoil. These actions cause great damage and can impair the ability of the land to yield future harvests. The corporation does not consider these long-term consequences. Corporations also have no use for wildlife or preserving natural habitats. These things have no market value attached to them and as such corporate interests will not advocate their preservation.

According to Tom Detwyler, a retired professor at the University of Wisconsin, capitalists have economic self-interests in not halting environmental problems[87]. He suggests that this is because if the environmental problem persists, the capitalists will have an opportunity to sell cures to the victims. One corporation can release pollutants while another company will have the opportunity to offer remediation services. Overall, this pattern of favoring cures over prevention is economically advantageous in a capitalists system, it even boosts the nation's GDP. Detwyler compares the goals of ecology, 'to minimize long-term environmental threats', to the goal of the capitalist which is 'to maximize short-term private financial profits'[88]. He finds that these goals directly counter each other. Corporate capitalists maximize while ecology aims to minimize. Corporate ideology is short term while ecology's goal is long term. Corporations work for private gain while ecology work for the public (environment). Lastly, the corporation is seeking to create financial profit, which uses resources, ecology seeks to limit harm in order to preserve resources. Detwyler points out that the goal of the corporation is money, not ethics or life preservation. The corporation values only actions that result in monetary profit, positive or negative externalities or consequences are ancillary.

American corporations may be particularly shortsighted and detrimental to the environment, compared to European corporations[89]. Conley suggests that this is because American corporations tend to focus narrowly on shareholders while European corporations focus on a broader range of stakeholders (employees, creditors, suppliers, communities). This is partly because unions have more power, growth rates are lower, and unemployment is higher in Europe. American short-term focus is also related to the power that mutual funds have over the institutional investor sector. Large institutional investors hold the majority of stock shares in America and Europe. The logic is as follows: corporations are dependent on institutional investors to finance their operations, pension funds and insurance companies have long time horizons for investment returns, mutual funds have relatively shorter time horizons, therefore institutional mutual fund investors may require corporations they invest in to deliver profits in the short-term. American financial markets are larger than European financial markets in the categories of equities, fund management (pension fund, insurance companies, mutual funds, private wealth management, hedge funds) and investment banking[90]. Short term focused funds

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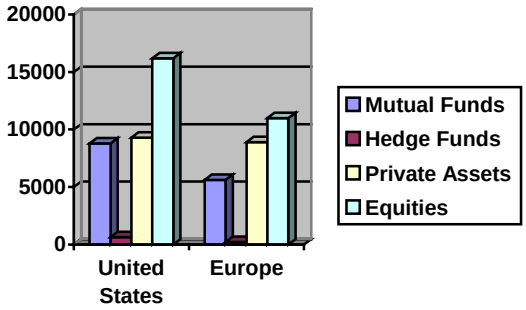
[87] Detwyler T, "Seven Potential Basis Causes of Environmental Stress: #1 Corporate Capitalism", located at http://www.uwsp.edu/geo/courses/geog100/Cause-CorpCap.htm accessed on May 26, 2006

[88] IBID, Detwyler

[89] Center for Progressive Reform - Conley JM, "Changing Corporate Behavior in a Socially Responsible Direction", located at http://www.progressiveregulation.org/perspectives/corp_behav.cfm accessed on June 5, 2006

[90] International Financial Services London Organization - "Financial Market Trends- Europe vs, US 2005", located at

such as mutual funds, hedge funds and private wealth management, as well as equities are all significantly higher in the U.S.;



2004 FIGURES MEASURES IN BILLIONS

SOURCE: International Financial Services London Organization - "Financial Market Trends- Europe vs, US 2005"

Since American financial markets have a larger proportion of short-term oriented investments, corporations that are dependent on these investments may adopt a shorter-term focus compared to European corporations. Additionally, European corporations are adopting the idea of 'corporate social responsibility' much faster than American corporations[91]. 'Corporate social responsibility' is the notion that corporations must deliver more than just financial returns to their shareholders, such as sustainable growth, fair employment, and social and environmental well being. In the United States, corporate social responsibility has been catching on. Evidence of this is present through the development of the Dow Jones Sustainability Indexes and the FTSE4Good Index Series which rates the performance of companies that are considered socially responsible. However, some see corporate social responsibility as a distortion that forces political goals of social welfare onto private companies that are tasked with maximizing private profits. These critics believe that social responsibility reduces a corporation's ability to advance their goals, can reduce social welfare, distract attention away from business ethics, prevent proper policies from being implemented, and may ultimately be ineffective as a means of deep systematic reform[92].

Advocates of corporate social responsibility hope that it is the ethical imposition needed to curb the socially and environmentally destructive tendencies of the corporation. These aspirations may be unreasonably high. Debrah Doane of Stanford's Graduate School of Business outlines 4 common myths about corporate social responsibility[93]. The first myth is that the market can deliver both short-term financial returns and long-term social benefits. This myth challenges the assumption that business outcomes and social objectives can be consistently aligned, noting that socially related investments are not likely to payoff in the two- to four-year time horizon that publicly traded companies are expected to deliver. This is directly related to the corporation's objective of creating shareholder value, which is short-term driven. The second myth Doane speaks of is that the ethical consumer will drive change. She notes that consumers are more concerned

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http://www.ifsl.org.uk/pdf_handler.cfm?file=Europe_vs_US_2005&CFID=281582&CFToken=40007824 accessed on June 5, 2006

[91] OpCit – Conley JM

[92] Crook C, "Survey: The Good Company", The Economist, Vol. 374, Issue 8410, January 22, 2005, p.4

[93] Doane D, "The Myth of CSR: The problem with assuming that companies can do well while also doing good is that markets don't really work that way", Stanford Social Innovation Review, Fall 2005, p.23-29

about price, taste or sell-by dates than ethics[94]. This point relates to the fact that there is a large gap between the rise of environmental consciousness and the actual purchasing behavior exhibited by consumers. The third myth is that there will be a competitive 'race to the top' over ethics among businesses, as companies use their socially responsible status as a comparative advantage over other businesses, forcing the rest of the market to adopt socially responsible practices. However, Doane notes that many companies position themselves as socially responsible in order to take advantage of good public relations, but do not substantially change their behavior[95]. This is called 'greenwashing' and it is very harmful since it can betray the public's trust in all socially responsible companies, including the legitimate ones. The last myth is that in the global economy, countries will compete to have the best ethical practices. This point is contentious, but is based on the observation that companies often fail to uphold voluntary standards of behavior in developing countries, choosing instead to follow the laws of the country in which they are operating. This point was argued in the globalization section of this chapter. Doane's assertions indicate that corporate social responsibility may not be the answer to curbing corporate practices that advocates had hoped for. Perhaps corporate social responsibility is best described by its detractors who believe that, "CSR{Corporate Social Responsibility} is little more than a cosmetic treatment. The human face that CSR applies to capitalism goes on each morning, gets increasingly smeared by day and washes off at night"[96].

Perhaps the most interesting observation about the nature of the capitalist corporation comes from Joel Bakan, a Canadian Law professor and author of the book, *The Corporation: The pathological pursuit of profit and power*[97]. Bakan argues that a corporation has the legal identity of an individual person, complete with the ability to enter into contracts, own property, and have human rights. Furthermore the corporation is legal required to act only in its own self interest, if a human person was only able to act in his or her own self interest that person would be labeled a psychopath. Bakan shows how the corporation displays psychopathic characteristics as measured by the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) such as a highly anti-social personality, breaches social and legal standards to get its way, and does not experience guilt. Bakan believes that the idea of corporate social responsibility is harmful because it allows corporations to deceive the public without making fundamental changes in its underlying behavior. He thinks corporate social responsibility is allowing the corporate psychopath to become charming by masking its true self-interested character instead of fundamentally changing it. The corporation has become the world' most dominant economic institution and it is troublesome to think about Bakan assertions about how such a power force can be so pathologically self serving and callous.

A Constitutional environmental right could be an objective ethic imposed on capitalism and corporate practices. Granting citizens environmental rights will create new exposure to liability for those entities that harm the environment, increase environmental health related risks, carryout environmental injustices, or act in ways that

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[94] IBID, Doane, p.26
[95] IBID, Doane, p. 27
[96] Crook C, "Survey: The Good Company", The Economist, Vol. 374, Issue 8410, January 22, 2005, p.4
[97] Bakan, J, *The Corporation: The Pathological Pursuit of Profits and Power*, Free Press, 2004

exploit the environment and compromise the well being of others. Environmental rights could serve to unify and strengthen environmental regulations for air, water, chemicals, wastes and exports. It would force companies to consider the environmental impacts of their actions, for fear of expensive litigation. It could also give Congress the Constitutional power to regulate the environment independent from the Commerce Clause, thus limiting economic considerations from environmental protection. Although a Constitutional environmental right will not cure all environmental problems, it has the potential to address many environmental issues that result from capitalistic practices.

Conclusion

Economists frequently use the term *ceteris paribus*, all things being equal, to compare economic models. This assumption is supposed to allow direct relationships to be measured without being affected by indirect events or criteria. *Ceteris paribus* is one of the silliest ideals employed by economists. This is because there are rarely real world applications in which scenarios can be compared were everything stays exactly the same except for the criteria you are trying to measure. For example, an economist would say that *ceteris paribus*, if the price of bananas falls, the demand for bananas will increase. Although this is a very simple and reasonable assumption, one can easily imagine how under the surface it is possible that not all things could really be equal. Perhaps the decreases in banana prices are because the bananas were delivered to the market very late and are close to going bad. Surely there would not be an increase in demand for these bad bananas. Perhaps the bananas are delivered to market on time and at a lower price because the farmer got a plentiful crop. However, demand for bananas did not increase because consumers bought apples instead of bananas because they were offered at an even more economical price. The reality is that the world is a dynamic, fast-paced and frequently changing place where hardly anything stays the same. The assumption of *ceteris paribus* is helpful in theoretical economics, but it is often unrealistic in real world applications. Adam Smith's theory of the 'Invisible Hand' guiding markets to efficiency and allowing capitalism to be beneficial for society as a whole through the pursuit of economic self-interest does not apply to today's economic environment. This is because all things are not equal. Smith's theory was formulated around 1776 when populations were much smaller, natural resources were seemingly endless, competition was relatively weak, markets were regional, and growth margin were large. Today's economy is vastly different as populations are growing exponentially, natural resources are dwindling, competition is fierce, global markets prevail and growth margins are decreasing.

Perhaps in the 21st century a 'threshold point' has been reached that Smith did not envision 230 years ago. It would be ridiculous to say that the assumption of *ceteris paribus* holds true after such a vast amount of time or to maintain that Smith could have imagined how the economy would evolve so far into the future. Certainly it appears that a 'threshold point' is imminent, were the benefits of economic growth are outweighed by the associated costs. These costs can be seen most readily in the destruction of the natural environment. The environment is the most obvious target because it is a public good that all people can enjoy, including corporations that enjoy it by plundering resources or using it as a receptacle for wastes and pollutants. Motivated solely by economic self-interest, the capitalist corporation will not consider the environment or the future in the same way an individual does. An individual, perhaps even an employee of a

corporation, might consider how the destruction of the environment will effect his or her children or how much the natural environment has changed since the time of his or her own childhood (development sprawl, changes in weather patterns, increase in oil prices, reduction in air visibility). The corporation does not behave like a normal individual, it doesn't consider non-monetary consequences, it only concentrates short-term profitable objectives for its shareholders. The corporation will not project far in the future or reflect upon the past, unless it is economically advantageous to do so.

The underlying problem behind the corporation is of course capitalism. Capitalism is what dictates the *modus operandi* of economic self-interest, the corporation simply compounds this problem by shortening the time allowed to deliver profits through financial quarters, the stock market and dependence on shareholders. Capitalism affects every area of American society including the government, public health decisions, environmental justice, and many others. The rise of globalization has allowed the ideals of capitalism to seep into every area of the globe. Breaking down boarders to allow the search for short-term maximized profits to carry on in any conceivable location without concern for individuals, societies or the environment. Via the WTO, many policies to protect egregious injustices committed by agents of corporate capitalism have been eliminated as barriers to free trade. Globalization has expanded market opportunities and delivered lower priced goods to consumers, giving them the impression that it is a good thing. Americans are consuming more than they need and perhaps are not much better off for it. The American GDP consistently climbs, adding to the notion that all is well. However, under the surface the well being of society as a whole may be stagnating and even declining. Plagued by hidden externalities, the environment is also suffering in the name of economic growth.

In the beginning of the chapter it was asserted that human beings interact with the environment in a way that suggests they believe the environment and the services it provides are inherent birthrights of the human species. This is a reasonable assumption and one that is consistent with much of economic theory and practice that has proliferated in the 20th and 21st centuries. A Constitutional environmental right would affirm that a clean and healthful environment is an inalienable right of every person, codifying the once unconscious assumption that many people believed into law. This would effectively help protect the environment, the rights of future generations, and the well being of current generations. This right would also depart with many traditional beliefs, such as the belief that the environment should be free for all to enjoy. Although there is no way to prevent people from freely breathing air, consuming fresh water, or enjoying the sunset provided by nature, it should be understood that modern day realities warrant increased environmental protection. More environmental protection comes at a cost that should be borne by society as a whole, including corporations, small businesses, the government and consumers. These increased costs should not be perceived as payments to use environmental services; they should be viewed as compensation to preserve the natural balance necessary for individual life, capitalism and the human species to survive. Furthermore, the difficulties and costs arising from the initial implementation of a Constitutional environmental right should not be viewed as inefficiencies of the right, they should be seen as corrections for decades of abuse and under valuation of the environment. After all, America gained its position as the supreme world power by exploiting the plentiful natural resources of the pristine environment in the 'new world'

and decimating its native inhabitants. Columbus arrived in America in 1492, by 1584 European settlers had landed near Roanoke Island, NC., and by 1789 the U.S. Constitution went into effect. In this relatively short time span the lands of America have been forever altered, in the name of economic self-interest. Comparatively, Europe has been occupied by relatively developed civilizations for thousands of years. Perhaps the fact that the European continent has be inhabited by civilization for so long, and has historically had to deal with limited natural resources, explains why it is so much more environmentally aware and advanced compared to the United States.

A Constitutional environmental right may be able to evolve America into a more sustainable society. Such a right would obviously raise consumer awareness of the fragility of the environment and the important role it plays in supporting human life. Consumer awareness could also be bolstered if an environmental labeling scheme was implemented in conjunction with this new right. This would enable environmental externalities to be accounted for and disclosed in accordance with the consumer's right to know. Government environmental cost benefit analysis procedures would be modified to better account for the irreplaceable benefits the environment provides and the complex and interwoven costs associated with environmental damage. The government would also be committed to adopting a set of environmental indicators to use along with the GDP, to more effectively measure national well being. An environmental right could perhaps help limit some of the more negative aspects of globalization, capitalism and the corporation by extending rights to all people. No longer will the U.S. Environmental Protection Agency be forced to track down every environmental offender, the extended rights afforded by this amendment will allow the average person to pursue legal redress against entities performing environmental injustices. A Constitutional environmental right will not be able to prevent all harm to the environment, however it has the potential to affect many economic aspects that devalue the environment. In this sense it is an important step in the objectively correct direction for mankind.