Environmental Issues in Law

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ABSTRACT

The field of environmental law has traditionally been placed under the umbrella of common law toxic torts. The current system for dealing with environmental law cases has proven to be inefficient and inadequate; according to parties who have an effect upon or have been effected by the system. Coming up with a proposal for change, however, may be easier said than done. With all the different questions, unknown answers, and different perspectives that saturate this particular field of law, it is often difficult to find a common ground between different groups of people. Each discipline seems to adhere to its own agenda with regard to dealing with environmental issues. Because each has its own motivations and interests, each has its own perspectives on the answers to such questions as: Which environmental concerns should be targeted? How should regulation of risks be carried out? How do we determine the value of human life? How do we determine causation?

In order to find a common ground and a mutually beneficial solution to many of these problems and questions, it is imperative that these different disciplines find some way to bring their perspectives together. As evidenced by new emerging fields such as "science as law," this shift toward shared perspectives is already happening. This article proposes that this shift be taken a step further—to where the field of environmental law and all the issues and problems associated with it begin to pull in many different perspectives from multiple disciplines to come up with mutually beneficial solutions.

I. INTRODUCTION

In trying to determine the value of life, or the costs and benefits associated with it, different disciplines make certain basic assumptions, and with these assumptions they do some things well and others poorly. One example is the economic perspective. Due to the concentration on individual conduct, economics tends not to see or accommodate concerns for culture, community, or nature. When determining causation, economic perspective makes it seem like actions are the result of individuals and not the government. Biology is just the opposite. It deals with the physical world rather than the cultural one, and so it does not take into account human forms of control.

One central issue in all of this is that these disciplines, be they economics, biology, geology, sociology, philosophy, or business, are now starting to be used as normative guides for conduct by government. In other words, there is no longer solely economics or just science, but economics as law or science as law. With this new perspective, the usual, safe assumptions of each discipline are open to public debate. In order to understand this debate, it is essential to gain an understanding of each individual discipline's perspectives on environmental issues and the

strengths and weaknesses associated with these perspectives. Only then will we be able to wisely determine how, or even if the discipline should combine to improve our environmental law system.

II. POLITICAL CONTRIBUTIONS AND THE PERSPECTIVE OF BUSINESS

When dealing with environmental concerns, it seems that different disciplines have very different perspectives about what should drive environmental decisions. Part of this disparity lies in the fact that the different disciplines have different aims and different motives for their actions. In the political arena and in the corporate world, environmental concerns and decisions are not always governed by a general concern for the environment itself or a general humanistic concern. Many other variables play into the equation of what issues to focus on. What does motivate these groups to pursue environmental issues? What drives their decisions?

In the contemporary democratic process, individual candidates must spend a great deal of money in order to successfully campaign for election. They must publicize in order to make themselves known and to present a political platform. In most cases, these individuals are not privately wealthy and must rely on contributions in order to fund their campaign. Frequently this money is provided by corporations intending to promote their private agendas, including environmental legislation. For the environmentalists, this corporate financing is clearly a case of political bribery, but businesses feel they are simply working within the capitalist system to make their position known.

Making the proper political connections and maintaining a good public image are becoming increasingly more difficult for businesses. Firms have made considerable contributions to politicians to make sure that their interests are represented when legislation is being negotiated. Meanwhile, government officials have often betrayed these contributors in order to win popularity polls when election time draws near. This political warfare has left businesses in a bad position in the eyes of the public. Many analysts argue that higher environmental standards in the business community will ultimately lead to greater profitability; businesses claim that short-term consequences of environmental regulations may place them at an economic disadvantage in comparison to international corporations.

It's the long term, increasingly cozy affinity between money and politics that has environmentalists most worried and this unseemly union not only breeds corruption, but citizens think it undermines valuable national assets as healthy air, clean water, and untrammeled wilderness.[1] How can ordinary Americans protect the environment when their elected officials are snugly nestled in the deep, deep pockets of corporate polluters?[2] This sort of statement is designed to corrupt corporate affairs in the eyes of the public. Although it cannot be denied that some businesses make large contributions to political campaign funds, the rationale behind these contributions depends on your perspective. A corporation functions much like an individual--it makes decisions and is responsible for its debts and pays taxes as a single entity. It does not, however, have the individual privilege of voting. In order to have a voice in the changing business environment, it is necessary for corporations to make their interests known. The best way for them to do so is through political allies. Therefore, they often make contributions to political

[1] B.J. Bergman, "Good Buy, 104th Congress," Sierra, 59 (Nov./Dec. 1996).
[2] B.J. Bergman, Id. at 59.

funds in order to establish these alliances. Politics has long been known for its dishonest practices. If the business community is able to take advantage of this predisposition to corruption, it could be argued that the community is simply making the most efficient use of the resources made available to it.

From an environmental perspective, the current political system is inherently catering to large corporations that can pay to have their demands met. In 1991 and 1992, environmental advocacy groups contributed a total of 1.3 million dollars in congressional campaign funding, yet, this figure pales in comparison to the reported 21.3 million dollars contributed by energy and natural resource companies alone.[3] Are our representatives making "unbiased" political decisions? Many environmentalists are promoting a drastic reduction in congressional campaign spending because environmental groups cannot economically compete with large corporations. According to Carl Pope, the Executive Director of the Sierra Club, "If we do not reduce the level of campaign spending, I genuinely fear that our experiment in democracy may be doomed."[4]

This problem of campaign spending can be addressed through a number of different avenues. One approach is to limit total campaign spending, which would eliminate the unlimited demand for funding by political candidates; a second possibility would be to limit campaign donations, in which such a limit would require candidates to develop or establish a much larger and necessarily more diverse base of support, and the final and probably most difficult reform would be to completely eliminate private campaign donations and instead provide full public financing for any candidate able to meet an arbitrary benchmark of popular support.[5]

III. THE BUSINESS PERSPECTIVE

A study conducted by the World Resources Institute (WRI) has recently shown that environmental regulations do not in fact hurt businesses, and it attempted to lay to rest a few of the myths often associated with these regulations, which showed that U.S. companies subject to the most stringent regulations were more competitive than companies operating under less strict oversight.[6] If pollution controls are bad for business then the companies more likely to pollute should also be more profitable, and yet, there is no tendency for higher toxic emissions to be associated with higher profitability.[7] The study also addressed such issues as moving highly toxic operations to developing countries, the job cost of environmental regulation, and firms may not need to make contributions to politicians in order to avoid environmental regulations because these regulations may not pose significant problems for the firms.[8]

Unfortunately, whether or not businesses need to make contributions in order to have their voice heard is not the issue. The simple fact is that they are indeed doing so, and on a much larger scale than ever before.[9] Since 1985, the [tobacco] industry has contributed more than $16.6 million to federal candidates, PACs and political party committees, and the industry's

[3] Paul Rauber, "Under the Influence", 79 Sierra 28, (Sept./Oct. 1994).
[4] Paul Rauber, Id. at 28.
[5] Paul Rauber, Id. at 30.
[6] Harris Collingwood, “Is Environmental Protection Really Bad for Business?” 21 Working Woman, 14 (June 1996).
[7] Harris Collingwood, Id. at 14.
[8] Harris Collingwood, Id. at 14.
[9] Vicki Kemper, "The Inhalers", Common Cause 19, (Spring 1995).

political giving has increased with every election cycle, for while the tobacco industry has often been targeted as the industry economically controlling the government.[10] If cigarettes were introduced today, they would most certainly be banned or controlled to a much greater extent than they currently are.[11] Kemper indicates that, Tobacco has been exempted from comprehensive laws regulating safety, product packaging, and hazardous and toxic substances, leading Scott Ballin [Chair of the Coalition on Smoking and Health] to charge that Congress has left tobacco virtually free of regulation, and this special treatment may be attributed to the vast amounts of political funding provided by the tobacco industry.[12]

Businesses, however, do not believe that they receive favorable treatment from the political system. From their perspective, the problem is that politicians frequently make use of their influence over business regulation to gain voter support, thereby damaging the public image of corporate America. For example, former President Clinton's plan to discourage underage smoking has led to bans on tobacco advertisements in places that are conspicuous to children and similarly, Chrysler Corporation was forced by the National Highway Traffic Safety Administration (NHTSA) to recall over 91,000 1995 Cirrus and Dodge Stratus vehicles for unsafe seatbelts, despite the fact that the belts passed factory tests prescribed by the agency, and Chrysler is "a victim of NHTSA's attempt to score points with the consumers."[13]

Businesses are attempting to function in the name of profits, as they always have, in a business environment that is becoming increasingly affected by political pressures and public image. They must do what they can to ensure their survival, which often means creating political alliances to further their cause. The businesses' perspective is that the real corruption starts when politicians return the business community's support by stabbing them in the back. Businesses then feel that they are creating political alliances by contributing funding to politicians in order to have their requests met. The business rationale even implies that government is obligated to meet the demands of the business community. This rationale simply overlooks or disregards the fact that this back-scratching is not only questionable ethically, but is in fact illegal; a direct violation of the Ethics in Government Act of 1989, which states that "No member of Congress shall solicit or accept anything of value from a person. . .whose interests may be substantially affected by the performance or non-performance of the individual's official duties."[14] Yet despite the Act, this favoritism is exactly what is going on between government and private businesses. It is hard to argue that these political donations from private industry do not have strings attached. It has been revealed by the Environmental Information Center that during a five year period, fifty-four political action committees (PACs) representing oil and gas interests contributed an average of $77,929 to each senator who later voted to open the Arctic National Wildlife Refuge to drilling, and in addition, this refuge is the last stretch of Alaskan coastline not desecrated by oil-and-gas development, and any development could endanger the natural wildlife and hence the Native cultures dependent on that wildlife.[15]

Political action committees are a central avenue through which interest groups pass money to politicians. One of them, the GOP Action Committee (GOPAC) was formerly run by Newt

[10] Vicki Kemper, Id. at 19.
[11] Vicki Kemper, Id. at 20.
[12] Vicki Kemper, Id at 20.
[13] Catherine Yang, "This Kind of Big Government May Win Clinton Votes" Business Week, 43, (July 29, 1996).
[14] Peter Montague, ”Corporate Investments”, 27 Environmental Action, 14, 15 (Winter 1996).
[15] Vicki Monks, "Capitol Games," 34 National Wildlife, 22, 24-27 (April/May 1996).

Gingrich, in which Gingrich neglected to register the GOPAC as a federal political action committee, and also denies that any political favors were provided for the large contributions by private industry.[16] The records, however, seem to indicate differently. The Upjohn Company's PAC, which contributed $17,500 to congressional representatives, received an exemption from the Federal Water Pollution Control Act in the House Appropriations Bill.[17] Specifically, Upjohn's Kalamazoo Water Reclamation Plant was exempted from cleaning its toxic waste and could save up to $500,000 each year by dumping toxins such as 1.2-dichloroetnane, and other toxins down the sewer at little or no cost.[18]

The Republican party is often criticized for its alliance with the business community. It is accused of being anti-environmental and operating on the whims of corporate America. The Republicans counter that their alignment with businesses can be paralleled to the Democratic alliance with labor unions and environmental organizations.[19] Yet, the Republicans' relationship with business appears to be economically driven, while the Democratic alliance could be categorized as motivated more by a concern for human health and protecting the state of the natural world.[20]

In this brief look at political contributions, it has become clear why it is so difficult for the business community and the environmentalists to see eye-to-eye. From a business perspective, corporations are simply working within the present system to make their position heard. They see nothing wrong with financially backing those politicians who they hope will defend the business position in time of legislation. The environmentalists, on the other hand, find this political bribery appalling, for they cannot economically back politicians to advocate their interests in litigation. They call for a revision of the system, for it is inherently flawed to favor whoever has the larger checkbook--namely, large businesses. Fortunately, businesses are finding better ways to cope with environmental legislation, and perhaps someday soon the interests of the environmental advocates will not be conflicting, but will be identical.

IV. THE PROBLEMS ASSOCIATED WITH LONG LATENCY PERIODS AND THE LACK OF DEFINITIVENESS PROVIDED BY EPIDEMIOLOGY AND TOXICOLOGY STUDIES

Individuals look at immediate risks verses latency. How risk is perceived by people on the street is much different than how risk is perceived by experts. Since these two worlds are so distant, there is the perception that it is unfair.

The litigation involving toxic torts, catastrophic injury, and mass disaster common law tort claims have made heavy demands on the judicial system because the litigation is complex, the victims are numerous, and uncertainty over the causal origins of injury creates exceptional problems of proof, which resulting complexities that are forcing some courts to reevaluate causation in the common law tort cases.[21] Toxic problems differ significantly from traditional

[16] Peter Montague, supra note 14 at 14.
[17] Peter Montague, supra note 14 at 14.
[18] Peter Montague, supra note 14 at 14
[19] Vicki Monks, supra note 15 at 24.
[20] Vicki Monks, supra note 15 at 24.
[21] Glen Robinson, "Probabilistic Causation and Compensation for Tortious Risk," 14 The Journal of Legal Studies, 779, 780, (1985).

tort cases in that they generally involve highly technical issues of toxicology and epidemiology.[22] Complex causal issues in toxic-related cases stand at the frontier of current medical and epidemiological inquiry, this being the case because of the long latency period of many toxic-related diseases, lack of medical and scientific information on toxic risks, and the exposed populations aggravate the problem.[23] Many types of cancer offer no physical evidence of the responsible agent and may be attributed to risk factors other than a defendant's product or activity.[24] According to a National Research Council Report, there was no information available on the toxicity of approximately 80% of the nearly 50,000 chemical substances that were in commercial use in the mid-1980s.[25] In addition, epidemiological data, which is increasingly relied upon in common law toxic tort cases where individual causation is unable to be proved, may be preliminary or unavailable at the time toxic-exposed victims begin to turn to the courts, and therefore, even when epidemiological studies are available, they generally do not provide the courts with legally sufficient proof that any given individual's illness was caused by a particular toxin.[26] The basic problem of proving causal relationships in an environment where multiple causation confounds the possibility of isolating one responsible cause makes a court's decision regarding liability even more difficult.[27] There are major problems with a fault-based tort system since the victim may not be able to identify the risk-creator or prove the injury relates specifically to a particular risk-creator, but only that as a group exposed to the risk he or she therefore has an increased risk of injury, and in addition, the risk-creator, even if identified, may not have sufficient funds to pay damages.[28] The principle purposes behind tort damage awards are deterrence and compensation for the victim's loss. There is ongoing debate concerning the degree to which common law toxic tort liability operates as a deterrent, if it indeed acts as a deterrent at all, in fact, many scholars contend that risk-creators do not respond to the threat of damage awards, instead they react to threats to their own safety, administrative regulation, and social pressure.[29] Securing compensation for this loss can prove extremely difficult when areas of increased environmental risk are involved. There are major transaction costs in proving injuries, but if a court does find the risk-creator liable at trial for injuries that leave a victim permanently unable to work, the court can then calculate a portion of the award with ease by adding the costs the victim has already incurred, such as past medical expenses, therapy charges, and earnings lost before trial, and thus calculating the remaining portion of the victim's award involves adding together the future medical costs and earnings the victim will forego because of the loss of the right to work, and this calculation is complicated because it must include events yet to occur.[30]

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[22] Donald Elliott, "Goal Analysis Verses Institutional Analysis of Toxic Compensation Systems," 73 The Georgetown Law Journal, 1357, 1367, (1985).

[23] Jack Weinstein & Eileen Hershenov, "The Effect of Equity in Mass Tort Law," 1991, 2 University of Illinois Law Review, 269, 310, (1991).

[24] Jack Weinstein & Eileen Hershenov, Id. note 23 at 310.

[25] Jack Weinstein & Eileen Hershenov, Id note 49, at 310.

[26] Jack Weinstein & Eileen Hershenov, Id note 49, at 310.

[27] Glen Robinson, Probabilistic Causation and Compensation for Tortious Risk," 14 The Journal of Legal Studies, 779, 780, (1985).

[28] Richard Epstein, "Why Restrain Alienation," 85 Columbia Law Review, 970, 973, (1985).

[29] Thomas Galligan, Jr., "Augmented Awards: The Efficient Evolution of Punitive Damages," 51 Louisiana Law Review, 6, 56, (1990).

[30] Comment, "Inflation, Productivity, and the Total Offset Method of Calculating Damages for Lost Future Earnings," 49 University of Chicago Law Review, 1003, (1982).

The conflict occurs over whether courts should look solely at the claims and interests of the parties before the court, or resolve seemingly private rights disputes in a way that serves the interests of the community as a whole.[31] Courts are likely to set damages below the actual harm suffered by the victim if part of the harm is speculative or intangible, and when the harm is speculative or intangible, it is difficult to prove in court and may be excluded from damages as a matter of law.[32] Also, the courts are likely to set the legal standard of care incorrectly if the costs and benefits of marginal changes in the risk-creator's precaution are difficult to observe.[33] There are fundamentally different ways that politicians, citizens, administrators, and the courts look at risk. There is no single right way to look at risk exposures. There are different lenses and, consequently, different viewpoints that are used by these groups.

V. DIFFICULTY IN PROVING A CAUSAL LINK IN ENVIRONMENTAL ISSUES

During recent years, as technology has advanced and public awareness of environmental concerns has increased, there have been several scares and public alerts concerning potentially harmful elements in our environment. A few examples include the asbestos scare, the lead poisoning scare and, the electromagnetic forces (EMF) scare. Often ignited by media reports and precautions taken by the EPA, these potentially harmful byproducts are often the catalysts of numerous lawsuits and prolific tort litigation across the country. However, often these cases have little scientific proof to support the claims of injury or damage to victims by risk-creators. In order to seek monetary awards against a risk-creator for their actions, the victims must prove that damages were suffered as a direct result of the risk-creator's negligence. Proving this link of causation is critical to the victim's success in proving the case.

There is, perhaps, no better illustration of the importance of the causal link than in regard to EMF tort litigation. EMF was at one time touted as the next mass tort. Litigation activity over EMF was expected to reach the proportion of litigation over asbestos, for the early days of EMF litigation closely mirrored those of asbestos litigation.[34] All of the early signs suggested a possible gold-mine for plaintiff attorneys, while power companies, responsible for the high voltage power lines that dot the American landscape and crisscross American neighborhoods everywhere, began to look for a defense.

You cannot see or hear EMFs, but they are an integral part of almost every American's daily life. And the most interesting feature of them is that the scientific community can definitively say whether EMFs are harmful to the human body or not. Scientists are constantly searching for the answer while lawyers on both sides present opposing evidence for and against the danger of EMFs, and thus, the result of EMF cases hinges almost entirely on the plaintiff's ability to provide a casual link between cancer and EMFs to the jury.[35]

The Council of the American Physical Society (APS) issued a Statement on Power lines and Public Health which put the Society's position on record. The APS claims there is no scientific basis for linking power frequency magnetic field exposure to increased cancer incidence, and we would be much better off directing the funds now spent on EMF mitigation to other, more

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[31] George Fletcher, Fairness and Utility in Tort Theory," 85 Harvard Law Review, 537, 540, (1972).
[32] Robert Cooter, "Economics Analysis of Punitive Damages", 56 Southern California Law Review, 79, 93 (1982).
[33] Robert Cooter, Id. at 93.
[34] Roy Krieger, "On the Line", American Bar Association Journal, 40 (January 1994).
[35] Richard Reuben, "Utility Power Plays", American Bar Association Journal, 18, (December 1996).

valid, environmental problems. The Society based its decision on the preponderance of the epidemiological and biophysical/biological research findings, which have failed to substantiate those studies, which have reported specific adverse health effects from exposure to such fields.[36] This is perhaps the biggest blow that could have been dealt to the countless victims/plaintiffs seeking damages as a result of EMF exposure. And as we can see from looking at the gamut of unsuccessful cases against EMF defendants, the juries of EMF cases have failed to find any correlation between EMF and cancer for many of the same reasons the APS also failed to find any causal link.

One of the main determinants of the APS' s decision was the lack of evidence demonstrated in the various epidemiological studies conducted on EMF and adverse health effects. Of course, many of these studies are difficult for lawyers, judges and juries to decipher, which could explain the low success rate. Nonetheless, an understanding of these studies is crucial to the success of environmental tort litigation and to proving the causal link. Because of the importance of the causal link for environmental litigation, the scientific community is overwhelmed by the need to determine causation. This need to determine causation is important not only for compensating present and past victims, but also for decisions that will affect possible future cases.

Another suspected cancer causing agent is chlorine, and according to a UC Berkeley Wellness Letter, there is no good substitute for chlorine as of yet, but one alternative is ozone.[37] Ozone is quite expensive, but has been used by Europeans for several years.[38] Five water treatment plants in Southern California were studying the feasibility of converting to ozone, which has a $150 million cost of converting their current chlorine-based plants.[39] Current research concludes that ozone leaves behind no toxic residuals and presents no dangers, however, experts originally believed that chlorine was also harmless and there is no way to determine if we will discover a link in the future between ozone and cancer or other diseases.[40] If we do discover one, as the Metropolitan Water District of Southern California responded, "[then] we're in a hell of a mess."[41] If billions of dollars are spent frivolously across the United States for the renovation of water plants, for no apparent reason, then a mess may be an understatement.

Indeed, the elimination of proving a causal link would cause an influx of frivolous lawsuits. Although the plaintiff may be at a disadvantage due to the difficulties in proving causation, current policies save businesses and taxpayers money, and they prevent the back log in litigation that would result if there was no requirement to show legal causation. Nevertheless, this need to establish causation proves to be quite a burden in many environmental cases. There are so many unknown variables in most of these environmental cases, and the problem is further amplified by all the different perspectives and their different methods of proving causation.

A. DEDUCTIVE LOGIC AND CAUSATION

[36] The American Physical Society"National Policy Statement, http://www.aps.org/statements/95.2html.
[37] University of California Berkeley Wellness Letter, V 11:12, p.5, (Sept. 1995).
[38] Emilla Askari, "Chlorine Out, Ozone in as Water Purifier." Los Angeles Herald Examiner. 13 Dec. 1988: 4SA. Internet at http://www.oxytherapy.com/oxyfiles/oxy00352.html.
[39] Emilla Askari, Id.
[40] Emilla Askari, Id.
[41] Emilla Askari, Id.

In deductive logic, causation is represented by the material conditional and the most common example of this type of logic in the English language is the "if. . . then" locution, logically denoted as 'if p, then q' or 'p ⊃ q.' [42] Now, it is true that all "if…then" locutions are not examples of causation; however, it is equally true that all examples of causation may be represented by the "if...then" locution, for instance, the statement "if the streets are wet, (then) it must be raining" should be interpreted to mean that the streets are wet because it is raining, i.e., the rain caused the streets to be wet.[43] All arguments involve the claim that their premisses provide some grounds for the truth of their conclusions, but only a deductive argument involves the claim that its premisses provide absolutely conclusive grounds and a deductive argument is valid when its premisses and conclusion are so related that it is absolutely impossible for the premisses to be true unless the conclusion is true also.[44]

Deductive logic helps us to view two events and identify which one is the cause, and which one is the effect. This may not be instinctively obvious, for instance, consider the following sentences: "if a river has been polluted for a long time, then all aquatic life in it must have ceased to exist" and "if all aquatic life has ceased to exist in a river, then the river must be polluted," although the lay-person may be confused as to the distinction between the two arguments, a logician would be quick to point out that only in the latter sentence is the death of aquatic life in the river a consequence of the pollution of the river and this follows from the fact that 'if p, then q' neither conveys the same information, nor has the same truth-value as, 'if q, then p'.[45]

B. SOCIOLOGY AND CAUSAL INFERENCE

Science identifies causation very narrowly, in which causality is only ascribed to a situation in which conditions such as, time-order (the cause must take place before the effect); correlation between cause and effect; and absence of alternative explanations.[46] Even in the scientific, controlled environment of the laboratory, causation, if thus defined, can never be proven because alternative explanations for the effect, especially random chance, can never be totally eliminated, and in this case, scientists use an arbitrary point of statistical significance, usually 90% to 95% significance, as the minimum significance required for causation, which simply means that a 95% significance means that there is less than a 5% likelihood that the relationship occurred as a result of random chance.[47] Scientists and the lawyer speak a different language when both are discussing causation. The lawyer needs to prove causation by more than 50%. Scientists require a 90% to 95% probability, before they contend that there is a causal connection. Furthermore, sociologists have come to the agreement that, while speaking about causation in the real world, we are dealing with causal models of real world processes, the accuracy of which depend on a

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[42] William Gustason & Dolph Ulrich, Elementary Symbolic Logic, Waveland, 29 (1989).
[43] William Gustason & Dolph Ulrich, Id
[44] Irving Copi, Symbolic Logic, MacMillan, 3, (1973).
[45] William Gustason & Dolph Ulrich, supra note 42, at 52.
[46] Edgar Borgatta, 1 Encyclopedia of Sociology, Macmillan, 255-257, (2000). See Hubert Blalock, Jr. "Causal Interference Models."
[47] William Mondenhall, Dennis Wackerly, and Richard Scheaffer, Mathematical Statistics with Application, PWS- Kent, 353-356, (1990). Georgios Karras, "Is Europe an Optimum Currency Area? Evidence on the Magnitude and Asymmetry of Common and Country-Specific Shocks in 20 European Countries," Journal of Economic Integration, 366-384, (September 1996).

combination of empirical evidence and untested assumptions, many of these assumptions are about the causal process itself, and can therefore never be subject to empirical verification.[48] This is true for all the sciences but more so in the social sciences, where the assumptions required to make interpretations or explanations of the underlying reality may depend upon a greater leap of faith than their natural science counterparts and each equation in the causal modeling literature has a specification error which represents omitted variables that produce unknown biases, in which case the specification error will behave in a certain manner, and the sociologist's assumptions about its behavior are unable to be tested with the data at hand, but are critical for his or her inferences.[49]

As has already been mentioned, in the field of litigation, because of exposure to toxic substances, the vast number of actions are tort actions seeking compensation, punitive damages and, occasionally, injunctions for injuries either caused or alleged by toxic substances.[50] The two problems involving causation are: (a) to establish that the chemical in question is capable of causing the harm or injury from which the plaintiff suffers; and (b) given that '(a)' has been established, to establish that the plaintiff's harm or injury did in fact result from exposure to this chemical.[51] In the former instance, it is necessary to remember that science has not yet advanced to the stage of being able to correlate particular toxic substances with particular injuries or harms. Scientific experimentation on humans is unethical and illegal, while experimentation on animals generally involves the use of much higher doses of the chemical than the doses to which human beings are exposed, and in the latter instance, the long latency period between exposure to a chemical and the development of, say, cancer, makes it very difficult, if not impossible, to determine causation.[52] The victim would state that it would be utterly absurd to even attempt to apply the rigid scientific criteria for causation in the field of environmental law, yet such is the standard that the risk-creator wants applied.

A victim would argue that in cases where a particular chemical has been correlated with an increased incidence of a particular harm, a fairly low probability, say 30%, instead of the 95% required in science, could be applied to establish causation. The rationale for this is that the preservation of human life is more important than the pursuit of wealth. In cases where the victim attempts to prove that the injury caused did occur due to exposure to the chemical, a preponderence, i.e. more than *50%*, of the evidence should be required for the victim to establish causation. This standard would also appear to provide a sufficient degree of protection from false claims for the risk-creator. As a matter of fact, this was the very standard used by Judge Weinstein in the Agent Orange Case.[53] It is in businesses' best interest not only to preserve the concept of causation, but also to set as high a standard of causation as possible, so as to make it more difficult for victims to be able to prove that a particular risk-creator was responsible for the injury or harm suffered by the risk-creator. On the other hand, it is in the victim's best interest to set as low a standard as possible for causation, thereby making it easy to prove causation. Whatever standard is adopted must tread a fine line between protecting honest and responsible

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[48] Edgar Borgatta, 1 Encyclopedia of Sociology, MacMillan, 255, (2000). Se Hubert Blalock, Jr., "Causal Interference Modds."

[49] Edgar Borgatta, Id, note 48, at 255.

[50] Roger Findley & Daniel Farber, Environmental Law, West, 266, (1992).

[51] Roger Findley & Daniel Farber, Id. at 269-70.

[52] Roger Findley & Daniel Farber, Id. at 270.

[53] Roger Findley & Daniel Farber, Id. at 271.

risk-creators, whether they be businesses, non-profits, or the government from frivolous lawsuits on the one hand, and on the other hand, preserving the victim's right to sue to obtain compensation (and perhaps punitive damages and injunctions) for injury or harm caused by a risk-creator.

C. THE PHILOSOPHER'S PERSPECTIVE ON CAUSATION

In addressing the concept of causation from a philosophical perspective, an analysis of the ideas of Immanuel Kant may be appropriate. Immanuel Kant investigated the intricate relationship between cause and effect, and believed that the way which we perceive cause and effect is relative to the nature of time, and the way in which humans understand time as a linear process.[54] We, as humans, perceive acts to happen in a particular order, and a linear progression is the way that process plays itself out and Gordon Steinhoff, who has spent a great deal of time developing the ideas of Kant, states that the argument is, very roughly, that we must presuppose the causal determination of events because this is the only way in which we can justify our thought of an irreversible order of representations of an event and thus make possible our experience of an event.[55] Therefore, Kant believes that causal forces are not deterministic in and of themselves, but are simply a convenient way of understanding a linear progression of events, which then makes it impossible, from Kant's perspective, for act A not to affect act B, assuming that act A is a predecessor to act B, thus each and every moment of time is by nature a necessary condition for the following moment and whatever happens to occur at this instant will inevitably affect what is happening five minutes from now, therefore, if the electrical supply to this computer were to be cut off, I would have to cease from working on this project. Each moment is a reaction to the preceding one and, in the required empirical representation provided by events the occurrence of the preceding part of time is a necessary condition of the occurrence of the succeeding, and then to what extent act A is a cause of act B is, of course, an entirely different matter, and has traditionally been left to the field of science to determine.[56]

Much of Western science and technology is based upon the idea that any event or action can be isolated and then studied; in a sense, removed from its surroundings so that it can be better understood and a philosopher such as Kant would say that this assumption is a fundamental mistake, for each act is necessarily related to acts that both precede it and acts that follow, and it is much more accurate to study an act within a series of processes, in order for a synthesis of empirical intuitions to occur, and so in order for us to experience an event, we must apply to events the concept of the relation of effects and causes.[57] This notion is what Kant terms the principle of the unity of apperception, and it is extended to be specific to each individual, while Steinhoff concludes that not only must representations stand together as united, but each of us must do the unifying or synthesizing of our own representations, and we must be aware of our own activity as we do this.[58] This complete process is what makes a determination of causation

[54] Gordon Steinhoff, "Kant's Argument for Causality in the Second Analogy,"34 International Philosophical Quarterly, 465 (Dec. 1994).
[55] Gordon Steinhof, Id at 465.
[56] Gordon Steinhoff, Id. at 467.
[57] Gordon Steinhoff, Id. at 469.
[58] Gordon Steinhoff, Id. at 471.

difficult for the discipline of philosophy; every person must individually perceive each act as part of an ongoing process, related to the past in the same way that the future is related to the present.

Of course, Kant is not the only philosopher who has made an effort to understand the relationship between cause and effect. Phil Dowe, a contemporary philosopher, examined the idea of backward causation and the direction of causal processes. While for our purposes his theoretical investigation is virtually meaningless, he does offer to the reader a variety of ideas concerning the nature of causation. He advances three kinds of theories of causal direction: temporal, subjective, and physical.[59] The temporal theory asserts that the direction of causation is defined by the direction of time, thus, A and B are cause and effect only if A is a precedent to B.[60] The subjective theory attempts to explain causal determination not as a feature of this world, but of the way in which we see the world, which is a way humans create categories to help them understand the natural world, but this subjective theory doesn't necessarily represent the way in which the natural world operates.[61] Finally, the physical theory reduces causal determination to something in this world, therefore, in contrast to the subjective theory, cause and effect is the way in which the world actually operates, unrelated to our perception of these processes.[62]

What, then, does all of this philosophical investigation offer us in the way of a legal theory? Unfortunately, it does not offer too much in terms of devising an alternate way of determining causation. There are, however, some broad points that may help in developing some new ideas in terms of causation and a causal link as it relates to tort law. First, if we accept the physical theory of causation, then we are acknowledging that the world operates on a system of causes and effects. It is important to understand that this diagnosis provides not simply a picture of the way that humans have been led to perceive the world, but that it also shows us how the world actually operates. If we accept this point, then we can pursue this idea to acknowledge the intricate inter-relatedness of all things. This concept also provides us with an important distinction; it is extremely simplistic to say that A causes B and that C causes D. We must understand that something is causing A, that A and B both affect C, and that D is the cause for countless other processes. Thus, cause and effect can better be understood as one continual process and not simply a series of unrelated events.

In terms of practical implications then, we as a society must learn to act long before the causal link between cause and effect can be established. Ken Geiser, in his projection of a sustainable community, says that "precaution shifts the burden of proving safety from those who would protect the environment to those who would release chemicals into it."[63] Causation has become much more of a problem since the introduction of toxic chemicals, which may remain in the environment for a long time before effecting individuals, thus making a causal connection difficult to prove. The philosopher might contend that the risk-creators must be required to do more long-term testing, to ensure that all of the effects are known before releasing toxins into the environment: Policies to promote sustainable industry would consider the risks of materials throughout their full life cycle-- from synthesis or extraction through processing, distribution, and

[59] Phil Dowe, "Backwards Causation and the Direction of Causal Processes", 105 Mind, 227, 232, (April 1996).
[60] Phil Dowe, Id. at 232.
[61] Phil Dowe, Id. at 232.
[62] Phil Dowe, Id. at 232.
[63] Ken Geiser, "The Greening of Industry—Making the Transition to a Sustainable Economy", Technology Review, 64, (Aug./Sept. 1991).

application to final disposal.[64] Hopefully, as the long-term effects of toxic chemicals are better understood, their use will be reduced. The philosopher might contend that the best solution is to not produce them. That solution would allow us to sidestep the problem of long-range and indirect causation that has arisen because of the immense production of toxic chemicals.

There are two main reasons for the controversy over the danger of chemicals and other pollutants: powerful interests typically have a stake in denying that their industries create health hazards and causal connections in these matters are inherently difficult to establish.[65] Therefore, the philosopher's perspective is that the legal code of causation is ineffective in environmental law.

If the legal community was able to come up with a valid, consistent means of determining causation in environmental law cases, and it was established that the legal community does have the right to regulate certain risks, be they public or private, how exactly should the process play out? Once again, we must come back to the questions of who or what to target, and exactly how this will be done. With so many perspectives, these are not easy questions to answer.

VI. THE CHANGING PERSPECTIVE OF BUSINESS

E.S. Woolard, Jr. former chairman and CEO of DuPont, had challenged DuPont and others in the chemical industry to focus on corporate environmentalism.[66] He contended that corporate environmentalism is an attitude and performance commitment that places corporate environmental stewardship fully in line with public desires and expectations, which means going beyond regulations and voluntarily reducing the negative environmental impacts of products and processes, and thus deals with how environmental information is integrated into business decision making, as well as with design processes, products, and packaging performed with environmental values and objectives in mind.[67] There is the anticipation of environmental trends to find the most cost-effective solutions to regulatory requirements, pollution prevention, and source reduction.[68]

William Reilly, former EPA Director and former officer with the Texas Pacific Group, indicated that in the past, there has been an important shift in environmental priority and sophistication of many large corporations in which businesses have begun to take the environment very seriously by engaging the most senior executives in environmental oversight, elevating decision making about environmental commitments, spending substantial amounts of money to go well beyond compliance with the law, and redesigning whole systems of resource use and production.[69] Both criminal and civil liabilities, the fear of exposure as an obstructionist polluter, concern to attract environmentally conscious engineers and scientists, and a sense of responsibility to neighbors and consumers have caused businesses to change their ways, which has been a transformation of public values into decisions by businesses involving risk assessment and then cost-benefit analysis.[70]

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[64] Ken Geiser, Id. at 70.
[65] Reich, Encyclopedia of Bioethics, Macmillan, 694 (1995).
[66] Marc Epstein, Measuring Corporate Environmental Performance, Irwin, (1996)
[67] Marc Epstein, Id. note 66, at V.
[68] Marc Epstein, Id. note 66, at V.
[69] Marc Epstein, Id. note 66, at vi-vii.
[70] Marc Epstein, Id. note 66, at vi-vii.

VII. GLOBAL WARMING: DIFFERING INTERNATIONAL PERSPECTIVES

What about value of life in regard to international treaties? Will the international treaty to stem global warming create 800,000 jobs or put 1.8 million out of work; will it cost the United States nothing, or will it consume two to four percent of Gross Domestic Product and trigger a massive recession?[71] The World Wildlife Fund calls the global warming treaty the world's last chance to head off a catastrophic century of warming; business groups call limits on fossil fuel use a grotesque overreaction to still uncertain scientific evidence.[72]

During the first step of the treaty process, the White House brought together scientists, economists, and business groups to try to reconcile their competing views, and these differences among domestic interests pale in comparison to the competing views of representatives from 167 nations in attendance at the conference in Kyoto, Japan, to negotiate the final treaty, since these nations are piously pro-environment in public but each nation's position favors its particular economic interests.[73]

U.S., Britain, Germany, Australia, developing nations, and OPEC nations have differing economic perspectives. Australia is eager to protect its coal exports, OPEC nations have eagerly done all they could to slow progress on the talks, developing nations have tried to exempt themselves from any binding emissions limits, Britain has already cut emissions, not out of environmental concerns, but by phasing out its money-losing coal industry in the early 1990s and shifting to more energy efficient natural gas and Germany has made significant cuts since 1990 by shutting down antiquated East German industries inherited in the reunification.[74]

The leading culprit for global warming is carbon dioxide (CO_2), which creates the paradox since carbon monoxide, nitrogen oxide and hydrocarbons are the pollutants that internal combustion engines, such as automobiles create, and in 1975, the automobile industry, in the United States was required by Federal law to add catalytic converters to automobiles to combat those pollutants, yet the role of the converter, as outlined in a new car owner's manual, is to convert harmful exhaust gases into harmless carbon dioxide and water vapor.[75] Automobile makers argue that the treaty will lead to stricter emissions laws and demands for higher mileage from automobiles, yet Chrysler has a concept vehicle under development that reduces not only exhaust pollutants, but also CO_2, since it gets 70 miles per gallon, but the future vehicle costs $60,000 more than today's average-priced $20,000 car, and the reality is that consumers are not willing to pay more for alternative fuel vehicles, so the automobile industry still has to get the cost lower, and that takes time.[76]

VIII. PSYCHOLOGICAL PERSPECTIVE AND THE VALUE OF A LIFE

An injury to a person may cause a certain amount of the enjoyment of life to be lost; death causes all future (i.e., potential) enjoyment to be lost. Individuals or their families, in case

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[71] Kevin Whitelaw, "All the World is Green on the Outside,"123 U.S. News and World Report, 39 (October 13, 1997).
[72] Kevin Whitelaw, Id. at 39.
[73] Kevin Whitelaw, Id. at 39.
[74] Kevin Whitelaw, Id. at 39.
[75] Mateja, "Carbon Dioxide Curb Pollutes Clean Air Treaty," Chicago Tribune, Section 3, 2 (December 26, 1997).
[76] Mateja, Id. at 2.

of the individual's death may, in addition to the economic loss and the pain and suffering caused by injury and death, request for hedonic damages of the court. Hedonic damages are the damages caused by the positive loss of enjoyment of life.[77] Psychologists or other mental health professionals would be in the best position to determine hedonic damages.[78] The value of a life is an issue not only in tort law, but also in virtually every regulation promulgated by the EPA.

According to the United States Declaration of Independence, everyone has the right to life, liberty, and the pursuit of happiness. Psychologist Abraham Maslow would say, however, that the value of every human life is not the same; in other words, according to Maslow, the value of a human life is determined according to the degree to which the basic human needs have been satisfied in the person and the greater the needs satisfied, the higher the value of the person's life.[79] This argument is based on the assumption that a person who has satisfied his or her needs to a significant extent will enjoy life more than a person who has not fulfilled his or her needs to such an extent, and Maslow believed that all human beings, irrespective of sex, race and culture, are motivated by the same basic needs.[80] These needs can be arranged in a hierarchy, with some needs being placed, by Maslow, at a lower level than others, and the rationale behind this argument is that a lower-level need must be satisfied or at least partially satisfied before the person becomes motivated by higher-level needs, thus in an ascending order, Maslow lists the following needs: physiological, safety, love and belongingness, esteem, and self-actualization.[81]

Physiological needs, including the needs for food, water, oxygen, a fixed body temperature, etc., are the most basic needs that any person can have, and people who do not have their physiological needs satisfied strive primarily to satisfy them.[82] In a study cited in Myers, thirty-six men were fed only half the amount needed to maintain their initial body weight; the subjects unconsciously began to act in ways that conserved energy; their weight plummeted, eventually stabilizing at about three-fourths of their original weight; they became obsessed with food to the point that when they watched a movie, they were only interested in the parts where people were eating, and paid no attention to the funny parts or the love scenes.[83]

When our physiological needs are fairly well satisfied, we begin to be motivated by the needs for our safety, and the safety needs include the need for physical security, stability, dependency, protection, law, order, structure, and freedom from illness, fear, anxiety, danger, and chaos.[84] The peaceful, smoothly running, good society usually allows most healthy adults to satisfy their physiological needs.[85] These safety needs are more preponderant in children, however, because children are afraid of the dark, animals, strangers, punishment by their parents, etc., yet there are neurotic adults who retain irrational fears from childhood are also dominated by these needs.[86]

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[77] Wolfgang Franz, "Hedonic Damages—How Far Can Economics Go?," 47 Washington State Bar News, 42, (Oct. 1993).
[78] Wolfgang Franz, Id. at 42.
[79] Jess Feist, Theories of Personality, Brown & Benchmark, 598-602, (1994).
[80] Jess Feist, Id. at 598.
[81] Jess Feist, Id. at 599.
[82] Jess Feist, Id .at 598.
[83] David Myers, Psychology, Worth, 355, (1992).
[84] Jess Feist, supra note 79, at 599.
[85] Abraham Maslow, Motivation and Personality, 80-83, Harper, (1954).
[86] Jess Feist, supra note 79, at 599-600.

Maslow claims that most adults are unable to fully satisfy their love and belongingness needs and in our society the thwarting of these needs is the most commonly found core in cases of maladjustment and psychopathology.[87] These needs include the need for love, the desire to belong (to a family, a club, etc.), the desire for sex, and the desire to both give and receive love, and these needs are felt most strongly, not by people who have had them either completely fulfilled or not fulfilled at all, but by those who have had them partially fulfilled.[88] People who have been able to satisfy their love and belongingness needs to a certain extent are able to pursue the esteem needs, such as the need for self-respect, confidence and competence, and these esteem needs may be broken into two sub-divisions: reputation needs (the need to feel respected, admired and liked by others) and self-esteem needs (the need to feel good about oneself), once people have met their esteem needs, they have the potential to satisfy their self-actualization needs.[89] According to Maslow self-actualization refers to man's desire for self-fulfillment, namely, the tendency for him to actualize his potential, and this tendency might be phrased as the desire for self-fulfillment and to become everything that one can.[90] Very few people actually reach self-actualization; however some of the public figures who Maslow might identify as being self-actualized would be Thomas Jefferson, Abraham Lincoln, Albert Einstein, Aldous Huxley, and Eleanor Roosevelt. However, this satisfaction does not automatically occur, people who have satisfied their esteem needs do not automatically proceed to fulfilling their self-actualization needs because, before reaching self-actualization, a person must necessarily embrace the external verities or what Maslow called B-values, and these are indicators of psychological health which include such values as truth, beauty, wholeness, effortlessness, simplicity, etc.[91]

To summarize, Maslow believed that the value of a human life is directly proportional to the degree of needs satisfied by the person. Since our resources are scarce, Maslow would probably have preferred us to expend these resources to preserve and protect, first and foremost, the lives of people who are self-actualized. Since such people are few and far-between, we should disburse the remainder of our resources to safeguard, in descending order, people who are stuck at the following stages: esteem needs, love and belongingness needs, safety needs and, lastly, physiological needs.

Maslow's theory can be faulted for being elitist and discriminatory towards the poor, who may not be able to fulfill their physiological and/or safety needs due to a lack of resources. More importantly, perhaps, for the purpose of determining the value of a life, is the fact that it is not easy for an observer to assess the degree to which another person has satisfied his or her needs. Even if making such an assessment were a fairly precise process, it would consume vast quantities of time and resources to identify, say, the degree of actualization of every citizen in a town of 100,000 citizens who were all exposed to hazardous wastes.

Every solution to the problem of environmental pollution is inherently concerned with the value of human life. However, our resources to combat environmental pollution are scarce and must be efficiently allocated. Since business is a vital component of today's society for efficient allocation of funds to occur, business would contend that they must be treated as an ally, not an antagonist. After all, environmental laws and regulations do not clean up society--ultimately, it is

[87] Abraham Maslow, supra note 85, at 340-341.
[88] Jess Feist, supra note 79, at 600-601.
[89] Jess Feist, supra note 79, at 601-602.
[90] Jess Feist, supra note 79, at 602.
[91] Jess Feist, supra note 79, at 608.

the risk-creator itself which must perform this job. In cases of injury or death resulting from environmental pollution or in cases where the risk of such pollution is being assessed, psychological theories relating to the extent of the enjoyment of life that was or could potentially be lost, play a significant role. The psychological theory reviewed here, namely that of Abraham Maslow, however, may be too expensive, time consuming, discriminatory and procedurally-difficult to apply to cases where a large number of people have been injured or died.

IX. BIOLOGIST'S VIEW ON THE VALUE OF LIFE

How much is one life worth? Which life? Any life? Or just a human life? Your life or my life? What about plants and animals? Do all of these have worth? Yes! Most forward-thinking biologists would tell you that all living things have a value and are worth something. This begs the question: what is the value of any or all of these living things? Can they only be valued collectively? That is, can an organism be valued only if all of the same organisms are considered together or can the organism stand alone and still be worth something? Where human life is concerned, one individual holds just as much weight as a large group. But does the same cry of justice rise up among the people when one elephant is shot as when an entire herd of thirty is slaughtered? In most cases the answer is no. Does it really matter when there are twenty-nine others left to do what elephants do? The perspective of a biologist is that this example illustrates how lacking humans are when it comes to valuing things. As Holmes Rolston III indicates, humans have fallen into the opinion that the only values that exist are humans values.[92] Biologists contend that the number one fallacy that is made involving lives, and value is placing an economic value on something. The most insensitive thing that can be done is to place such human values on non-human organisms, and we are also guilty of viewing non-humans in an undemocratic way, by basing all our judgments on the metaphor of man's empire over inferior creatures rather than the metaphor of the democracy of all life.[93]

Everything living on this earth would still have value even if humans were extinct. Each thing has a tremendous value to the other living organisms in its community. Each thing provides a link in the ecosystem that relies on all organisms being present for the ecosystem to remain healthy and functional. Consider a spider in a forest. To the robin that feeds him to one of her babies, that spider's value is off the scale. The harmful human belief that other creatures aren't valuable causes miss-prioritizing of what is necessary for good quality human life. There are certain problems that must be addressed when trying to create the best quality for life: population, peace, pollution, poverty, politics, and progress.[94] As Potter points out, the first five are a matter of survival, partly in terms of progress. This way of thinking, therefore, demands that human values be placed on non-humans as a means of working them into the equation for a high-quality life with lots of progress. A biologist might say what we ought to be doing is placing non-humans into the other five categories. They are necessary for our survival, but not necessary for our progress.

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[92] Holmes Rolston III, Philosophy Gone Wild, Prometheus Books, 44, (1986).

[93] Lynda Birke & Ruth Hubbard, Reinventing Biology, Indiana University Press, 50, (1995); see "Democratizing Biology" by Vandana Shiva.

[94] Van Rensselaer Potter, Bioethics: Bridge to the Future, Prentice-Hall, 151, (1971).

The biologist's perspective might be that no amount of money is too much to spend to save even one individual, human or not. But, the truth of the matter is that a monetary value cannot be assigned to living organisms equitably, as there is no way to tabulate how much money an organism is worth. There are no value judgments in economics because economics as a special discipline is concerned with the consequences of changes in circumstances on the course of events, not with evaluation.[95]

Since environmentalists and biologists believe that all organisms are significantly valuable to biodiversity and to perpetuation of the ecosystem, regulations have been enacted to protect many aspects of our lives and our environment, and virtually no aspect of our lives, from the air we breathe to the food we eat and the safety of our workplace, is outside the scope of federal regulation.[96]

Sometimes agencies often exacerbate concern about trivial or nonexistent problems, and many times, regulatory actions are undertaken to demonstrate agency concern rather than an attempt to reduce risk.[97] Standards are enacted on the basis of only fragmentary evidence of a potential health or safety hazard with no evidence about the costs of implementing the standard or the collection of scientific data that suggests a risk does not justify the imposition of a regulation.[98] Biologists would contend that these inefficiencies must be corrected. Alternative policies could be analyzed and the effects of uncertainties identified to set a reasonable course of action.

According to Peter W. Huber, a senior fellow of the Manhattan Institute for Policy Research, phantom risk describes risks that tend to hover indefinitely in the background and never seem to crystallize, and these phantom risks are in contrast with those risks that can actually be nailed down, such as smoking and thalidomide.[99]. Before 1975, federal courts applied the *Frye* test, which held that propositions garbed as science, to be presented by expert witnesses, must have attained some level of general acceptance in a larger scientific community.[100] The rationale now is based on a let-it-all-in approach, which operates from a principle that if only one scientist believes in a theory, then it still may hold validity.[101] This rationale revolves around the Galileo argument, in which the scientist Galileo had a theory that no other scientist supported, and yet Galileo was proven later to be absolutely correct, so, courts will hear information that is supported by only one scientist, wondering if this scientist is the next Galileo.[102] The irony in the situation is that the ultimate science court is the Supreme Court, upon which there sit no scientists, so, any scientific evidence may be heard in a court of law, although the ears which hear the information usually have no scientific education, therefore, Huber suggests requiring scientists to write down their claims and expose them to scientific peers for possible rejection before offering them in court is not suppression, but a vindication of the scientific process.[103]

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[95] Sidney Hook, Human Values and Economic Policy, New York Press, 86, (1967); see "Value Judgments in Economics" by Milton Friedman.

[96] Robert Crandall and Lester Lave, The Scientific Basis of Health and Safety Regulation, The Brookings Institution, 1 (1981).

[97] Robert Crandall and Lester Lave, Id. at 1.

[98] Robert Crandall, Id. at 3.

[99] Peter Huber, "Coping with Phantom Risks in the Courts", Concord, 1, (1994).

[100] Frye v. U.S., 293F. 1013 (1923).

[101] Daubert v. Merrell Dow Pharmaceuticals, Inc., 509 U.S., 579 (1993).

[102] Peter Huber, supra note 99, 1&2.

[103] Peter Huber, supra note 99 at 1&2.

Under our present court system, evidence that is only supported by one scientist can now be presented in court. Those who hear that scientific evidence and make a decision have little or no knowledge about science or how to interpret the evidence. There is great need in this new field of science as law to close this gap and bring both sides (scientists and the regulators) to a common ground of understanding. Scientists should sympathize with the regulator's situation, and regulators should sympathize with the scientist's position, and then the biologist could contend that regulations would be successful and efficient.

X. THE PHILOSOPHER'S VIEW ON THE VALUE OF A LIFE

Perhaps an economist and a philosopher have two of the most extreme views of the issue in determining the value of life. In law, especially environmental law, however, this issue is questioned constantly. The EPA addresses this issue when it considers a new regulation or forms the National Priorities List. The EPA must consider this issue when determining between different environmental clean-up and preventive options. While a philosopher argues that the determination cannot be solely based on economics, economics is currently one of the bases of the process. An economist might agree with the philosopher that economics might not be the all encompassing and ethically sound determination, but the economist would contend that it is the most productive and provides concrete numbers, which are important when developing a cost-benefit analysis. A human being is truly ethical only when he or she obeys the compulsion to help all life, which he or she is able to assist, and shrinks from injuring anything that lives, thus life as such is sacred to him or her.[104]

This idea reflects a compassionate attitude towards all forms of life, and Albert Schweitzer, one of the most famous Christian missionaries of the twentieth century, is known for his ethic of reverence for life, while calling for humans to broaden their circle of concern to include not only human life, but all life forms.[105] Schweitzer was willing to practice what he preached, as he was often observed rescuing insects from drowning in puddles.[106] This display of concern for all forms of life is probably considered extreme by societal standards, but what causes us to value life at all, or some forms of life more than others?

The question "How much is a life worth?" raises a host of other questions. First, the question refers to the life of a human being. Does other life have value, even if it's just the value that we choose to place upon it? If the question assumes that only human life has inherent value, then the philosopher would contend that we are working from within an anthropocentric framework. Perhaps this framework was intentional, but it seems to be writing off all other forms of life as valueless. Secondly, it seems extremely problematic to allot a certain value or worth to a life. If something is given a value, then this value does not seem to be an intrinsic part of that being. How much is a life worth to whom? We should begin by addressing these two concerns before proceeding to answer the original question.

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[104] Albert Schweitzer The Ethics of Reverence for Life, Animals and Christianity: A Book of Readings, Crossroads, 118, (1988).
[105] Kinsley, Ecology and Religion, Prentice Hall, 123 (1995).
[106] Kinsley, Id. at 123.

As environmentalists work to protect the integrity of any natural entity, from a mountain to a small fish, they are often asked what good they are accomplishing. This type of question implies that things are only good in serving human purposes, and do not have any intrinsic worth. Bill Devall notes that humans then become the referent for all value in the dominant world-view and anthropocentric modes of thinking permeate our culture.[107] While it may be important for us to ask questions such as these, it is also important for humans to consider the possibility that other living beings have an inherent worth apart from their worth to human beings. This attitude has widely contributed to human domination over the natural world. Philosopher Holmes Rolston III, an environmental ethicist, contends that there is something overspecialized about an ethic, held by the dominant class of *Homo Sapiens*, that regards the welfare of only one of several million species as an object and beneficiary of duty.[108] Of course, this issue does not serve to help answer the question of the worth of a life, but it does highlight the biased stance from which the question is asked.

This issue leads to the second concern: assigning a certain worth to a life. Even if the question is phrased to include all forms of life, it still assumes that natural entities have no worth in and of themselves and are only present to serve human purposes. Many supporters of deep ecology are critical of cost-benefit analyses because economists developing such analyses reject the intrinsic worth of natural entities and attempt to value nature as a resource for humans.[109] If the question is phrased to include only human life, the implications seem even more disturbing. It then implies that even human life is only valuable in that it serves the needs of the larger society. The question then becomes not what is a life worth to itself, but rather what is a life worth to other humans, and as soon as you assign an economic value to a species, we have admitted that it is a commodity that can be exploited.[110] While some people may assert that natural entities have worth only to serve human purposes, they may have trouble agreeing that their life is only valuable to serve the society as a whole.

We can now return to the question of the worth of a life. There are a plethora of value systems which one can use in judging the value of life. Stephen Kellert, a professor in the School of Forestry and Environmental Studies at Yale University, acknowledges nine different value systems from which one can make value judgments regarding life, and they range from a utilitarian stance, which advocates the greatest good for the greatest number, to the aesthetic stance, which values those things that appear as pleasing to the human eye.[111] Kellert asserts that every person uses one of the value systems to make judgments, and each of these value systems reflects the concerns and prejudices of the individual evaluator, while many people believe that we may not be able to assign an economic value to everything; they assert that life is priceless, and indeed, to assess wildlife and environmental values fairly and meaningfully, it may be necessary to avoid an economic standard.[112] The philosopher could contend that perhaps we need to develop a new standard of evaluation, one that incorporates more than economics. As a society, we need to open our eyes to the inherent value of all life, and transcend the anthropocentric tendency

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[107] Bill Devall, Simple in Means, Rich Ends, Peregrine Smith Books, 25 (1988).
[108] Holmes Rolston III, supra note, at 92, at 91-115.
[109] Bill Devall, supra note, 107 at 30-32 & 82-84.
[110] Sanjida O'Connell, "Inherently Self-Interest", 141 New Scientist, 46, (Feb. 19, 1994).
[111] Stephen Kellert, "Assessing Wildlife and Environmental Value in Cost-Benefit Analysis", 18 Journal of Environmental Management, 363 (Vol. 18, 1984).
[112] Stephen Kellert, Id at 363.

supported by our religious and governmental structures, yet in every case, we are confronted by the dilemma of generating prices for the priceless, of quantifying the unquantifiable, of creating commensurable units for things apparently inequitable.[113]

While the philosopher might first need to consider the value of human life verses the value of other species' lives, in most environmental law cases, the issue is the value of human life. It is human beings who sue risk-creators for damages they have caused. Regulations are based on protecting human health. However, anthropocentric that view, it is true. Therefore, in considering the value of life in an environmental context, it only makes sense that the focus be on human life.

There are obviously many different opinions and perspectives about how to value human life. Not many people like the thought of placing value on life—mine, yours, or those who are close to us. We like to think that we would sacrifice all costs in order to keep ourselves, our families, etc. alive. Life is priceless, we think! The reality of the matter is, however, that we do and must place value on life. Every time we take a risk—skydiving, riding in a car, or even walking outside to get the mail—we are placing a value on our lives. The fact that we have people starving in the world, and likely in our own hometowns, we see that society itself places a value on life. This concept is not far-fetched or unnatural; rather, it is a realistic one. The question we must deal with, though, is how much responsibility should courts take to determine the value of our lives?

It may seem very unreal to apply a numerical or dollar value to a human life, but some value has to be used or applied to environmental regulations. It takes money to make changes in our current system. It takes money to do the necessary research and required procedures to pass regulations. Monetary cost must be part of our consideration when dealing with environmental issues, which is why cost benefit analysis is a very useful tool in this field.

XI. CONCLUSION

So far in this article, we have touched upon many questions regarding standards for environmental regulations: What should drive environmental law decisions? Which environmental concerns present the greatest risk? Which risks should be targeted? Should our judicial system even have the power to regulate these risks? Should proof of causation be required in order to establish regulations, and if so, how do we determine causation? How do we place value on life? Furthermore, we have seen that with each of these questions comes a variety of answers, based on differing perspectives and opinions. As noted at the beginning of the article, each discipline and perspective seems to do some things well and others poorly. This being the case, it only seems natural that our solution for handling environmental regulations incorporate as many perspectives as possible to capture as many benefits and strengths as possible. This synergistic approach is being used in businesses across the country who place workers in teams and in classrooms where students work in study groups, and both approaches lend themselves to the same goal: to gain more by bringing different people and different perspectives to the table than would be gained by having one individual and one perspective. The success of this approach has led to its widespread use in many types of organizations and systems—why should the legal arena be any exception?

[113] Stephen Kellert, Id. at 363.

The courtroom has already seen the positive effects of having different disciplines and perspectives come together. For example, Victor Yannacone realized, while standing in the middle of a courtroom in Riverhead, New York, that he was fighting a losing battle, by alleging that the Suffolk County Mosquito Control Commission was killing fish and wildlife while injecting poisons into potential sources of food by spraying DDT.[114] He knew that the battle could not be won without the help of scientific evidence, so the Environmental Defense Fund and Yannacone banded together to ban the use of DDT locally, and the EDF continued the fight nationally and encouraged the EPA to eliminate the fatal pesticide in 1972.[115]

This case shows that the combination of science and law has been effective in the crusade to aid and halt environmental damage. The partnership of scientific research and the legal system is becoming increasing more important with the rising complexity of environmental issues. Current environmental issues on trial require a far deeper erudition about chemical reactions, the function of ecosystems, and the limits to safe exposure--erudition which outreaches the scope of knowledge possessed by traditional lawyers. Science is concerned with objective truths and theories that can be verified by those who have extensive training in scientific method. On the other hand, law involves rules and regulations translated by judges and juries, who lack the knowledge to adequately and thoroughly evaluate scientific evidence. To enable continued success in the environmental crusade, it is important to encourage such teamwork—different perspectives working together to allow better understanding, and thus, better decisions being made.

[114] 1998 Annual Report of Environmental Defense, http://www.environmenaldefense.org/pubs/Annualreport/1998/b his.html, see http://www.lihistory.com/8/hs821a.htm.

[115] 1998 Annual Report of Environmental Defense, Id.