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Journal

Electronic Green Journal, 1(11)

Authors

Miller, DeMond Shondell
Green, John J.
Gill, Duane A.

Publication Date

1999

DOI

10.5070/G311110351

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Bridging the Gap Between the Reductionist Perspective of Public Policy and the Precautionary Perspective of Communities

[DeMond Shondell Miller](#)

Rowan University

[John J. Green](#)

University of Missouri-Columbia

[Duane A. Gill](#)

Mississippi State University

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Abstract

Oftentimes, community residents, industrial developers and civic leaders do not share the same philosophical orientation regarding exposure to toxins in the environment. This paper examines the roles that both the precautionary and reductionist principles play in shaping environmental policies related to human exposure to environmental hazards. The exploration and transportation of oil from the North Slope of Alaska is a specific example that illustrates the use of the perspectives by various claims makers. To conclude this theoretical debate, we offer possible solutions to link the two perspectives.

Introduction

There is an ongoing debate over what constitutes the underlying assumptions guiding the formulation of environmental policy. In general, two perspectives dominate the discussion of environmental policy formation. Those citizens following the precautionary perspective take the position that society should not act in ways that damage the environment, and that environmental policy should reflect these views. However, adherents to the reductionist perspective argue that there should be few restrictions on substances or development activities, unless there is indisputable proof that these activities or substances cause damage. Since the cost and benefits of halting development or limiting chemical use must be assessed based on local community needs, policymakers use a method of analysis which assigns a mathematically derived score indicating the likelihood of a future environmental disaster resulting from errors associated with proposed projects or development. Despite the inherent weaknesses of using only mathematically derived scores to predict the risk of hazardous medical, environmental, and economic side effects for the community, policymakers advocate a reductionist perspective. The reductionist perspective is used to encourage citizens to support development, even if the development

activities are associated with health hazards.

The conflict between the precautionary and reductionist perspectives is apparent in the issues surrounding the development and transport of oil on the North Slope of Alaska to the port at Valdez, and ultimately to oil refineries geographically dispersed around the United States. Commercial fishers, Alaska Natives, and environmentalists fought the development of oil extraction and transportation, warning that precaution should be taken because there were no conclusive studies indicating the extent of damage posed to the human and natural environments in the event of a major oil spill. Meanwhile, the oil industry and many policymakers utilized the reductionist perspective in policy formation and implementation.

The philosophy guiding the implementation of public policy has a direct impact on human interaction. Failure to realize the weak points in both perspectives limits the usefulness of policies created to serve the citizens. We propose that fundamental differences between the two perspectives often render environmental policies less effective because of a failure to incorporate citizen's concerns.

Battling Perspectives

The Debate

The two modes of thought concerning how policymakers and the public determine what is dangerous and what should be done about hazards in the community posed by development are the reductionist perspective and the precautionary perspective. Both perspectives are used to some extent in the policy-making process. However, the precautionary perspective⁴ tends to be used by the public at large; the reductionist perspective tends to be used overwhelmingly by industry officials and policymakers (see Hannigan, 1995).

Proponents of the precautionary perspective argue that in conducting analysis, scientists should look at substances in a holistic way; scientists should not ignore interaction *between* different parts of the ecosystem. If researchers are not sure of the potential danger, substances suspected of presenting harm should not be used (Hannigan, 1995: 80-81) or industrial developments should not proceed. Adherents to this approach maintain that if there is reason to suspect that a particular substance or practice endangers the environment or public health, then immediate action to prevent such impacts must be taken (Wynne & Meyer, 1993). Evidence supporting claims of the citizens and consequences of environmental degradation may not always need validation by scientific inquiry. Conversely, the reductionists argue that in conducting analysis, scientists should control

for variation and look at individual substances separately. If there is no scientific evidence of danger, then there should be no regulation. The scientific approach is commonly used when assessing environmental risks. Indeed policymakers commonly view the validity of the scientific method as the authority that governs decisions on policies pertaining to environmental risks.

There are distinctions that separate the two perspectives. First, the use of the precautionary perspective relies heavily on the interpretation of previous events to understand the likelihood of future events. The precautionary view cannot provide statistical analysis of the likelihood that a problem will occur. In most cases, individuals are not sure of specific hazardous impacts associated with development. However, many citizens have knowledge of prior disasters in their community, or disasters in other parts of the world such as Bhopal, and generalize the possibility of a disaster in their community, thus forming an assessment of risk related to their immediate environment. Many reductionists consider this unscientific form of risk assessment to have no expert authority, and they argue the data is unreliable.

A second problem with the precautionary perspective, according to its critics, is its failure to conform to scientific methodology. Although advances in the social scientific study of community contamination are increasing, the precautionary principle remains unclear. As earlier noted, the precautionary principle denotes a warning of clear danger. However, unanswered questions remain when we view this perspective. Uncertainty remains when researchers fail to understand social-demographic relationships *vis-à-vis* alienation and one's ability to construct one's own reality. Normlessness and powerlessness become critical indicators of how people perceive themselves and how they cope with technological disasters.

In essence, we argue that the precautionary principle is about empowerment, fear, and threat of loss. The more involved one is in the community's future, the less alienated one feels when confronted with the impacts of toxins in that community. The precautionary principle allows individuals to assert their own beliefs, rally together, and plan changes viewed for the betterment of the community as a whole. Oftentimes, there are structural conditions that cause subjective alienation. For example, disagreements between local, state and national agencies; disagreements within the scientific community; and corporate/political alliances which overshadow community interests often leave the community without a clear direction in a time of disaster. Many times, the interests of politicians fail to match the interests of their constituents. Alienation of the constituents from the entire process occurs when the community's development is left up to

outsiders and shutting community citizens and leaders out of the process (Couch & Kroll-Smith, 1991).

Rationale for Precautionary Stance

The Wingspread Statement on the Precautionary Principle summarizes the principle this way: "When an activity raises threats of harm to the environment or human health, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically." (See <http://eande.lbl.gov/VirtualPresidio/vpjournal/beta98/beta98.05/precautionary.html>.)

Avoiding alienation is important; however, fear of environmentally induced health hazards and threat of economic loss are other compelling reasons why citizens exercise precaution when potentially environmentally hazardous companies attempt to locate facilities that produce dangerous waste in their community. Hobfoll (1988) termed this approach of avoidance the Conservation of Resources (COR) model. The COR model is based on the premise that individuals strive to obtain, retain, and protect what they value (Hobfoll, 1989). In this model, material and non-material possessions are termed resources. Any threats to resources are likely to produce action that will conserve or prevent loss of resources. For instance, proposals to create a new landfill pose potential threats to the environment, but they also raise community health concerns and can threaten property value. Furthermore, COR argues that people strive to obtain, retain, and protect what they value (Hobfoll 1989). In this model, material and non-material possessions individuals value are termed resources. Fluctuation in any one of the resources is cause for serious alarm. Hobfoll defines psychological stress as a reaction to the environment that is likely to occur when (1) resources are lost, (2) resources are threatened with loss, or (3) individuals invest resources without consequent and consummate gain of resources.

Hobfoll identifies four types of resources that, when lost or gained, result in stress: (1) Object *resources* are physical objects linked to socioeconomic status; (2) condition *resources* refer to circumstances that are favorable or less favorable; (3) energy *resources* include time, money or the staff to complete tasks; (4) personal characteristics or *general resistance resources* refer to a positive sense of self. Hobfoll (1988) also says that individuals engage in activities such as grassroots organizations, local government, and local clean-up efforts to increase their chances of gaining positive outcomes.

COR assumes that people use the four resources they possess to obtain, retain, and protect what they value (Hobfoll, 1989). These resources can be

physical possessions, psychological or emotional comfort, and social resources. Hobfoll (1988) also espouses that individuals engage in their community in order to increase the chances that they will gain positive outcomes while undertaking minimal risks.

Risk Assessment and Policy Formation

The use of the reductionist perspective forces policymakers to rely on risk assessment techniques that may or may not form environmental policies which guide the use and development of the natural environment. While early environmental policy involved management of natural resources, policy after the 1970s is more regulatory of the substances entering the environment. In order to control many practices, including chemical production and disposal, Congress enacted risk-based and risk-balancing statutes. These policies require the Environmental Protection Agency (EPA) to assess risks of certain substances and developments and then to "either protect the public" with "adequate margins of safety" against "unreasonable risks" or to make choices that would "balance those risks against economic benefits" (Andrews, 1997: 208-211).

Risk assessment is now used in varying degrees by all federal, health, and environmental regulatory agencies, as well as many state agencies. This has given rise to the institutionalization of risk analysis as a profession. There is a growing community of risk assessors working in several areas: the government, corporations, consulting firms, universities and research institutions, and advocacy groups. Despite this trend, there is still not total agreement on the usefulness and/or appropriateness of risk assessment in policy formation (Andrews, 1997: 212-213).

Although risk assessment as a technique and discipline claims to be a science, it must make judgements in practice that cannot be reduced to scientific equations. Risk analysis is more dependent on science (Cumming, 1981). And within the rigorous implementation of scientific methodology, subjective means of data collection (i.e. personal bias as to what data to collect or what data to overlook) are used to obtain "objective measurements." When using a reductionist perspective, risk assessors must make elementary assumptions and measure associations through mathematical models based on fragments of data oftentimes collected via subjective means. Risk assessment can estimate the probability of disasters occurring, but the risk assessment process cannot determine the impact of outcomes or the combined effect of multiple risks posed to human health and the environment (Andrews, 1997: 213-215).

Another problem in using risk assessment as a basis for policy involves

industry's subjective control of science. In research concerning the industrial use of polychlorinated biphenyl (PCB), Nash and Krisch (1988) argue that industry was well aware of the health hazards of PCBs very early on. Industry delayed the presentation of results of an epidemiological study to the public and manipulated its conclusions in such a way as to hinder scientific decision-making in the policy process.

A Case in Point: Oil in Alaska

One well-documented example of the use of the precautionary principle by communities and the reductionist principle by government and business interests is the economic development of the Trans-Alaska Pipeline and its use up to the *Exxon Valdez* oil spill. Here we outline some of the main points of the conflict in relation to the time line of events.

The Standard Oil Company of California staked the first claim to oil on the North Slope of Alaska in 1921. In 1923, areas likely to contain oil were reserved for potential military exploitation in case of an emergency. As early as 1946, oil companies began a preliminary study of the feasibility of constructing a pipeline from the North Slope to an ice-free port in South Alaska (Cooper, 1973). Oil and gas production in the state overall rose to the point that by 1969 Alaska ranked seventh among oil-producing states (Berry, 1975). In February of 1969, a taskforce concluded that an all-land route through Canada was politically, technologically, and environmentally possible. From this conclusion, the Trans-Alaska Pipeline System (TAPS) emerged, along with the decision to construct a 798-mile, hot-oil pipeline from Prudhoe Bay to Valdez through the interior of Alaska (Coates, 1991). Tankers were to be used to transport petroleum to the lower forty-eight states.

The TAPS proposal became the heart of a number of environmental debates. Local organizations such as the Cordova District Fisheries United (CDFU) and Alaska native corporations centered the dispute over the location of the pipeline terminal and risks posed by tanker traffic to the environment, commercial fishing, and native villages. Citizens of the Cordova community, "where fishing and the fish processing industry account for 50 percent of the total employment," alerted officials to the possible effects of pollution and potential spill risks if tanker traffic frequented the sound (Coates, 1989: 220-221). By August of 1970 TAPS had reorganized to become the Alyeska Pipeline Service Company (Alyeska) (Coates, 1991).

In 1971, the Department of the Interior released a draft of its environmental impact statement as required by the National Environmental Protection Act (NEPA). The draft report concluded that building a pipeline would be the

least environmentally destructive and the most economically advantageous development option. The final environmental impact statement for the pipeline was released on March 20, 1972. Although claiming there was insufficient information available to assess risks associated with the pipeline's construction, the impact statement noted that in the case of a major accident most of the oil would end up in the marine environment (Coates, 1991). One of the main risks identified in the impact statement was that a tanker might break up in Prince William Sound with there being little chance for immediate clean up. In a worst case scenario, statisticians estimated that a major spill might occur once a year (Marshall, 1989). However, most estimates, especially those on which policymakers focus, put the risk of a major disaster at a much lower instance. Despite warnings, the report argued that it was necessary to have a pipeline built to reduce dependency on foreign oil (Coates, 1991).

To keep the pristine waters clean, residents of many communities fought plans to initiate the pipeline. This battle was argued before the United States District Court. On August 15, 1972, District Judge Hart ruled that the oil company plans were in violation of the Mineral Leasing Act. On October 6, 1972, the United States District Court of Appeals decided that the project could not be approved, unless Congress passed an amendment altering the Mineral Leasing Act. Moreover, the court ruled that any special permits that had been obtained were illegally granted (Coates, 1991).

Eventually, an act of Congress would redirect this judgement against the pipeline's construction. On January 16, 1974, President Nixon signed a special bill into law-- the Gravel Amendment-- permitting the pipeline's construction. The Environmental Defense Fund, the Wilderness Society, and Friends of the Earth filed a suite on constitutional grounds, but the injunction was lifted (Gramling & Freudenberg, 1997).

Since the time of its opening, the port of Valdez has been very busy. The pipeline carries an average of 1.7 million barrels of oil daily. In 1991, the volume of oil flowing through the pipeline constituted approximately 20% of the United States oil production. Despite such volume, there is little storage capacity at the Valdez terminal. As a result, oil must be shipped out at about the same rate as it enters into the terminals. The *Exxon Valdez*, with the capacity to hold 1.2 million barrels of oil, was one of the largest tankers docking at the port in 1989. An average of two to three tankers must pick up oil each day to allow the flow of oil to remain constant. This adds up to approximately 700 to 1,100 tankers crossing the waters of Prince William Sound each year (Gramling & Freudenburg, 1992: 190).

Discussion

At the root of the conflict between the precautionary and reductionist perspectives is disagreement over how valid are citizens' common sense and concerns when considering questions of environmental or economic development. Whitehead (1949) notes that, "Neither common-sense nor science can proceed without departing from the strict consideration of what is the actual experience." The presentation of the proposal to our "common sense" or stock of accumulated knowledge about the world is measured against what is already at the core of our beliefs about the world. The addition of knowledge forms a base on which future judgements about hazards are made. This knowledge is not always absolute, but in many communities confronted by potentially hazardous community impacts, these situations suggest impending threat. Moreover, the hazards warrant immediate action to subvert disastrous impacts.

Concerning the basis of policy, good science is traditionally defined as an approach that focuses on determining the capacity of an ecosystem to assimilate pollutants without harming the environment. From the findings of such an endeavor, industry is licensed to discharge potentially hazardous waste within acceptable limits. Although quite a bit of ambiguity is allowable in scientific research, when it comes to congressional testimony or court proceedings, the burden of proof is much stricter (Hannigan, 1995: 81). The reification of scientific data encourages a false sense of security and offers a convenient excuse for avoiding action to prevent potential harm to the public.

In contrast to the reductionists, citizens facing risk will most likely exhibit a conservatism that focuses on caution. They prefer a type of "worst-case scenario," while hoping for the best, rather than the "best-case scenario" used by regulators (van Eijndhoven, et al., 1985: 6; Edelestein, 1988: 131). Chemical spills force communities to disrupt their routine way of life. Because the trauma communities face is a major problem, they seek to avoid disasters brought on from chemical spills. As a result, they adopt a precautionary stand.

An example of the precautionary perspective expressed in public debate can be found in the controversy surrounding the proposed construction of a hazardous waste facility in Noxubee County, Mississippi. At a public hearing before the Mississippi Department of Environmental Quality (DEQ), a resident stated,

Clearly, the corporations have all the 'real world' factors heavily weighted in their favor while the public has only the hope for some meaningful state

regulations for its protection.

Those regulations should then assume an alternative background scenario of adverse circumstances or possible defect conditions, if they are to be designed to meet their objective-- even as corporations themselves do when making decisions for profit.

Only by considering the likelihood of the worst set of circumstances and then explaining how every regulation fully relates to that situation in both quantitative and qualitative ways, can the Department of Environmental Quality begin to meet the need for the guaranteed safety of the citizens of Mississippi (Mississippi, 1992: 17-18).

Policymakers and industry officials focus most of their attention on the likelihood of a disaster and weigh this information against the supposed benefits of, for example, oil extraction in Alaska or hazardous waste in Mississippi. While this is considered by many to be a rational approach, it might not be so, at least not in a humanistic sense. While risk assessors generally consider the public as irrational in their fear of certain risks, Perrow (1984) suggest that this might not necessarily be so.

Three main rationales dominate the risk related literature: 1) *Absolute rationality* is that rationality that has been offered by the economists and engineers in how decisions are made or should be made; 2) *bounded or limited rationality* is the form continuously emphasized by risk assessors, and 3) *cultural or social rationality*, our main concern here, is argued by Perrow as the way that we humans make decisions. Social rationality recognizes the limits of rational choice, but still holds that such limits can be beneficial to public safety. These limits may make us human in ways that we treasure (Perrow, 1984: 315, 321).

There are two main reasons we may be thankful for our so-called limited cognitive capabilities. Our limitations bring a social bond through diversity of skills and interests. Also, if we were all equally rational in the same respects-- for example, if we all had a propensity toward quantitative analysis-- we might very well overlook the more qualitative issues in life. There are experts in the world who have a greater likelihood than others to solve a particular problem, but these experts also run the risk of posing the wrong question. Through a combination of different interests and propensities, we are less restricted, but if we rely on a mono-cultural definition of risk, such as that posed by risk assessors, we do run such a danger (Perrow, 1984: 321-322).

Policy Implications: Bridging the Gap

The Citizen as an Expert Advocate

The reductionist perspective is in favor of finding acceptable levels of risk. The acceptable level might prevent the very worst from happening, but it offers a "blank check" of uncertainty. In the past we viewed risk as a totally external power, but it is often an internal creation. Environmental risks are often the product of human decisions.

The quantitative likelihood of a major accident occurring is not the only aspect of a disaster that should be taken into account in making decisions. We argue that psychological, social, and physical damages of environmental contamination constitute a part of the danger posed by a waste facility. Everyday knowledge about the world gives legitimacy to the community stakeholders in the decision-making process. Although this form of expertise is not similar to that of scientific rigor, the experiences of the lives of community residents are real. Many citizens develop a level of expertise suited for particular cultural or ecological conditions that are not reproducible in laboratory environments. For example, in England, farm workers regularly exposed to the pesticide 245-T were effectively kept out of the policy-making process concerning regulation of the chemical. However, these farm workers interacting directly with the toxic pesticide had a special kind of expertise about the "real world" application of the chemicals; they knew that what the government was considering to be normal working conditions were actually abnormal for day-to-day operations. According to Irwin, people exposed to environmental dangers are experts in the truest sense of the term since they serve as living specimens through being exposed to the particular hazard. This type of expertise needs to be recognized rather than privileging the current system of enforcing change from above (Irwin, 1995: 112, 175).

Social and knowledge relationships must be integrated to bridge the policy and citizen gap. Policymakers need to provide a mechanism that weighs subjective data collection with a degree of importance. It needs to be understood that there is no *single* authority when it comes to issues such as human risk from environmental impacts. Society must be reflexive concerning the uncertainties, limitations, and constructive possibilities of science to be applicable to everyday life. The political process should be willing to accept that citizens' concerns for their environment, community, and health will not simply fall into established categories of policymakers; rather, citizens need to be heard and considered in the environmental policy-making process. Institutions should be flexible and open to change (Irwin, 1995: 167).

Robert Bullard (1993: 203) recommends a strategy for more effective policy

by placing an emphasis on concepts of justice. Environmental justice, as a strategy, involves the incorporation of the principle that all individuals have a right to protection from environmental degradation. This would necessarily lead to adopting a public health model of prevention-- elimination of the threat before it occurs.

Beck (1995: 6) argues that one of the most important ways to uncover and change inherent flaws in the regulatory system is to create a system of accountability on all levels. The following are some of his recommendations:

- Change the required burden of proof so that representatives of technology and industry must justify themselves to the public.
- Open committees and expert groups in the "gray zone of politics, science, and industry" to a variety of disciplines, alternative experts, and lay people.
- Continuously raise liability issues and reform liability law.
- Reveal the lack of insurance or insurability of many technological enterprises.

More attention needs to be focussed on improving the policy -making process and its output through use of citizen input. Here we have touched on some of the propositions that have been made. Still, the first step to bridging the gap is accepting the social nature of environmental problems. Without this, we are locked into a stagnant system with little likelihood of further policy effectiveness.

Conclusion

The approaches to understanding and constructing environmental reality rely on the precautionary and reductionist perspectives. For proponents of the precautionary view, a number of manifestations of human and environmental harm can be deduced by predicting a particular event from the occurrence of general events, which seem similar in nature. Those citizens likely to suffer the impact of environmental devastation argue that their conclusions based on logical deductible methods are just as valid as those conclusions offered by the practitioners of normal science (see Kuhn 1973) who employ an inductive approach to their reasoning.

Shortly before the *Exxon Valdez* oil spill occurred, there were numerous attempts to warn Alaska officials and local communities of the impact of a major oil spill. However, the warnings did not convince government leaders to consider limiting tanker traffic and instituting stricter pipeline regulations. In response to the spill, the State of Alaska fought to retain its legitimacy and *save face*, as a state body, by removing any blame for the oil spill from

its agencies. Shifting responsibility for the accident was difficult to do, since the state was forewarned with internal memorandums of prior oil spills and realized that an incident such as the *Exxon Valdez* oil spill could occur. In essence, the state knew that the threat of a major spill was a real problem.

For impacted communities of the Trans-Alaska Pipeline and the *Exxon Valdez* oil spill, to say "I told you so" is not enough to heal the wounds caused by the spill. Reminding policymakers of prior environmental disasters in other parts of the world was not enough to sway the increasing demand for oil in the lower forty-eight states. Many of the policies regarding the construction of the pipeline, transport of oil, and ways to eliminate the impacts of major disasters can be linked to reliance upon reductionist thought. The use of mathematical models may prove useful, but over-reliance on them can be misleading.

Acknowledging that flaws exist in our current political and economic systems along with acknowledging the importance of citizens' knowledge about the everyday environment, brings us to the following conclusion: There must be a change in how we perceive communities at risk of environmental hazards and hazardous development. Traditional science cannot be expected to solve social, economic, and political problems. When policies reflect the community's concerns and the knowledge that people acquire from their local environments, policies to protect the environment and govern development may prove effective. We do not believe that a simple change in thought alone will lead to perfect policy output; however, we argue that it is a good place to start.

Footnotes:

1. For more information: Benton, 1991; Dickins, 1992; Redclift, 1984; Cotgrove, 1982; Vig & Axelrod 1999
2. For related material, see United Nations, *Agenda 21: Programme of Action for Sustainable Development*. 1993, E.93.I.11.
3. Development is conceptualized as energy exploration, nuclear power development near residential areas, or other efforts by humans to alter the environment which could alter the health or other wellbeing of citizens. Usually developers seek economic opportunities *via* environmental exploration.
4. The precautionary perspective is philosophically rooted in the "Wingspread Statement." The precautionary principle was introduced in Europe in the 1980s and became the basis for the 1987 treaty that bans dumping of toxic

substances in the North Sea. A growing number of Swedish and German environmental laws are based on the precautionary principle. The Wingspread Statement is the first to define its major components and explain the rationale behind the precautionary principle. (For further information see <http://eande.lbl.gov/VirtualPresidio/vpjournal/beta98/beta98.05/precautionary.html>.)

The "Wingspread Statement" on the Precautionary Principle

The release and use of toxic substances, the exploitation of resources, and physical alterations of the environment have had substantial unintended consequences affecting human health and the environment. Some of these concerns are high rates of learning deficiencies, asthma, cancer, birth defects, and species extinction; along with global climate change, stratospheric ozone depletion, and worldwide contamination with toxic substances and nuclear materials.

We believe existing environmental regulations and other decisions, particularly those based on risk assessment, have failed to protect adequately human health and the environment - the larger system of which humans are but a part.

We believe there is compelling evidence that damage to humans and the worldwide environment is of such magnitude and seriousness that new principles for conducting human activities are necessary.

While we realize that human activities may involve hazards, people must proceed more carefully than has been the case in recent history. Corporations, government entities, organizations, communities, scientists, and other individuals must adopt a precautionary approach to all human endeavors.

Therefore, it is necessary to implement the Precautionary Principle: When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.

In this context the proponent of an activity, rather than the public, should bear the burden of proof.

The process of applying the Precautionary Principle must be open, informed and democratic and must include potentially affected parties. It must also involve an examination of the full range of alternatives,

including no action.

5. Numerous studies have found that powerlessness is negatively correlated with social indicators such as family income, occupational prestige, social class, and education (Bullough 1969; Mirowsky & Ross 1983; Mirowsky & Ross 1984; Miztuchi 1964; Nelson 1968; Ross et al 1983; Wheaton 1980, Couch and Kroll-Smith 1991).

6. Listed below are examples of federal statutes passed since 1970: Federal Water Pollution Control Act (1972); Federal Environmental Pesticides Control Act (1972); Safe Drinking Water Act (1974); Toxic Substances Control Act (1974); Clean Water Act Amendments (1977); Clean Air Act Amendments (1977); Comprehensive Environmental Response Compensation and Liability Act (Superfund Act of 1980); Resource Conservation and Recovery Act Amendments (1984); Safe Drinking Water Acts (1986); Superfund Amendments (1986); Federal Insecticide, Fungicide and Rodenticide Act Amendments (1988); Ocean Dumping Act (1988); Clean Air Act Amendments (1990); Safe Drinking Water Act Amendments (1996)

7. In 1973, the energy panic secured widespread congressional and popular support for the pipeline project. See Robert Sommer. 1973. "Ecology and the Energy Shortage." The Nation. 217: 615-616.

8. Former Governor of the State of Washington, Dixy Lee Ray, once exclaimed: "Everybody is exposed to radiation...A little more or a little bit less is of no consequence" (Leiper 1994). Beck (1992) calls such acceptance levels "phony tricks." There are no true, universally acceptable environmental risks that can be generalized to situations. Issues of acceptability are generally historically, socially, and geographically oriented to specific issues. Yes, there are general guidelines, but each community is unique and what is acceptable to one community may not be to another. In essence, an acceptance level is an invitation to environmental harm. The acceptance level is nothing more than a blank check (Beck 1992). The primary assumption of acceptance levels is existence of an inherent danger that causes massive public harm if introduced. However, as long as the poisons are released in smaller amounts, then only a few of the disastrous effects will occur.

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DeMond Shondell Miller, millerd@rowan.edu, Department of Sociology, Liberal Arts and Sciences Institute, Rowan University, Glassboro, New Jersey 08028, USA.

John J. Green, Department of Rural Sociology, University of Missouri-

Columbia, Columbia, Missouri 65211, USA.

Duane A. Gill, Department of Sociology, Anthropology and Social Work And
The Social Science Research Center, Mississippi State University, Mississippi
State, Mississippi 39762, USA.

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