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**UNDERSTANDING  
COMPREHENSIVE ENVIRONMENTAL DECISION MAKING  
WITH NAVIGATIONAL AIDS FOR THE 1990S AND BEYOND**

**BY  
MARGARET ALICE TAKAKI**

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## ABSTRACT

The Comprehensive Environmental Decision Making (CEDM) paradigm developed through this research conceptualizes CEDM through a particular way of seeing a commitment to man's relationship with his environment.

Previous research has explored CEDM, but the idea remains ill-defined. The challenge in this research is to reestablish the guiding ideas of the government–environment–citizens matrix, while at the same time describe a meaning and means of operation suitable for environmental professionals working in industry today, where the man–environment commitment is critical to economic growth and environmental quality.

In this research a meaning and means of operation begins with Lynton K. Caldwell's guiding ideas. As an avenue of implementation, government structures established through The National Environmental Policy Act and the Pollution Prevention Act provide policy reinforcement. Accepting policy as a CEDM avenue the requirements of environmental understanding, information and perception are developed through aspects of the environment and sustainable development with rational ecology ultimately providing the guideposts and criteria whereby CEDM may be judged. Citizens are those environmental professionals where an ethic is shaped through systems learning with the Environmental Management System used as a framework to establish the CEDM network of relationships in the workplace.

The professional's socially binding value is hypothesized as an obligation not to do harm. With this value orientation, rational ethics and systems thinking provide guidelines that direct the professional in evaluating and optimizing policy and business structures. The CEDM paradigm is illustrated as a social choice mechanism suited to the 1990s and beyond by using case studies to apply policy directions.

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## **PART A**

### **INTRODUCTION**

Environmental decision making occurs whenever a decision must be made that affects the present or future quality of the environment. If it were easy to make good decisions on all issues affecting the environment, then there would be no need for this research; however, this is not the case.

### **Chapter 1: BACKGROUND**

This chapter introduces a perspective on Comprehensive Environmental Decision Making (CEDM) and presents a brief discussion of the context in which this research was conducted.

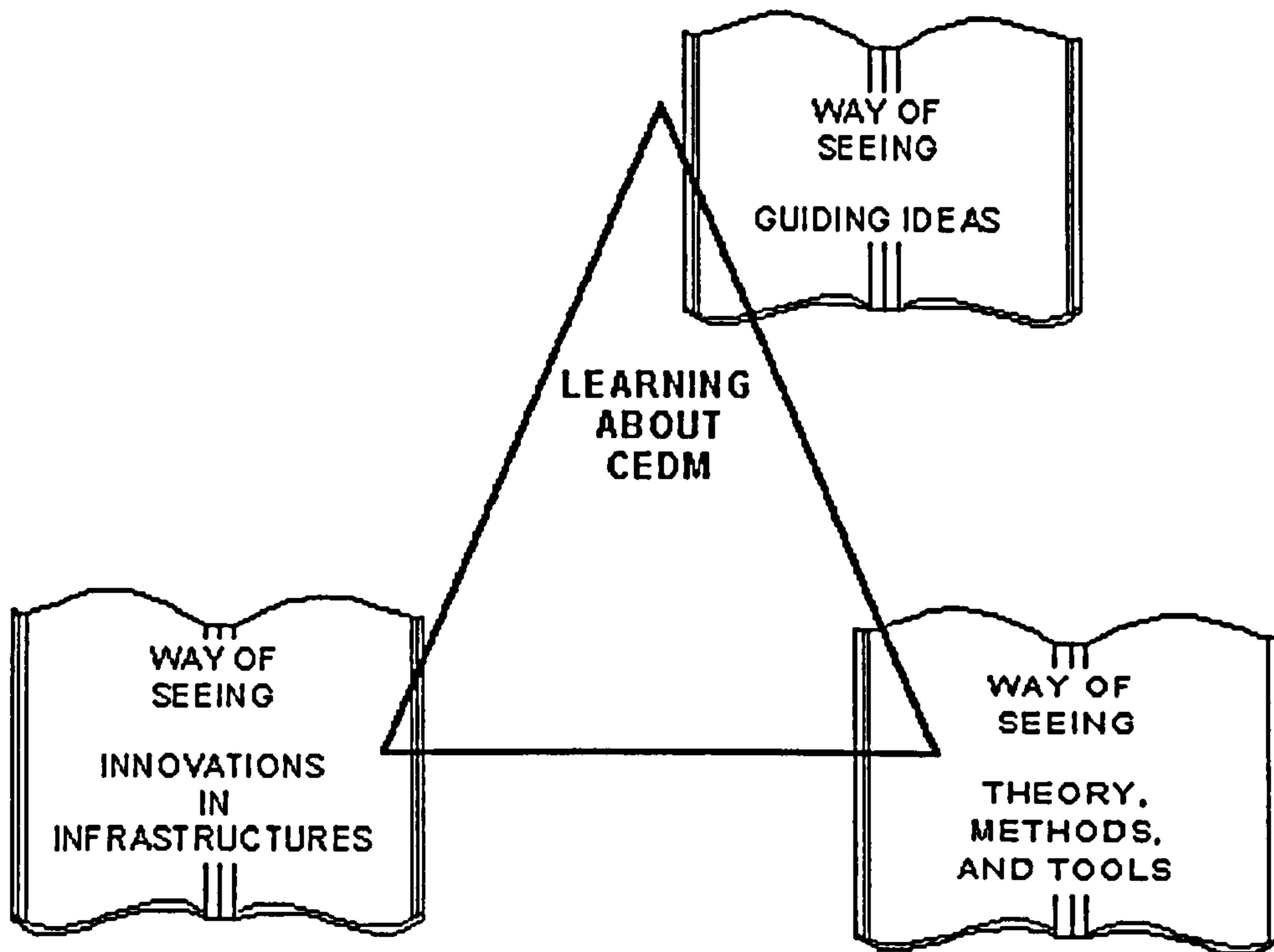
#### **1.1 LEARNING**

Strategic thinking and learning starts with our reflection on the deepest nature of an undertaking and on the central challenge it poses. The focus of this research is aimed at assigning a meaning to CEDM and determining whether and how it can be practiced by an environmental professional.

Learning occurs through the interaction of stimulating or seeding ideas, theory, methods, tools and innovations in infrastructure. From the learning perspective, stimulating or seeding ideas are first received, developed, and then articulated as a way of ordering the multitudinous phenomena of the world. Such ideas provide direction and a sense of purpose. These ideas are clarified and formalized through an integration with theory which underlies methods and tools. The interaction between ideas, theories, methods and tools lies at the heart of any field of human endeavor that truly builds and provides a contribution to knowledge.



The infrastructure in which we operate provides opportunity and resources to pursue ideas. Thus, changes in infrastructure or technology capability can provide the stimulus for new ideas or a new theoretical framework in which innovative ideas are more readily expressed. Innovations in infrastructures can occur at many levels, and on occasion the environmental professional may be able to demonstrate the power of innovative ideas through specific practices aimed at better environmental decision making in a particular context. Figure 1 shows the relationships of learning presented in the physical structure of a triangle.



**FIGURE 1 LEARNING TRIANGLE**

In this context, the research argues a role for CEDM by articulating a paradigm of generalizations, beliefs and values which affect and influence the overall domain of thinking and action represented by the components of the triangle. The rationale for this research revolves around the premise that only through learning will a CEDM awareness be built that results in a commitment to the environment that can be characterized in a government,

citizens and environment priorities matrix. This matrix, discussed in Part B of the research, establishes the priorities of CEDM.

Such a commitment to the environment implies a conscious decision to reorder priorities and create a new context within which environmental professionals can operate. Commitment implies a maturing of the professional's mind and a reassessment of current attitudes and beliefs, awareness and sensibilities as well as of skills and capabilities. Results in the long-term will be measured quantitatively through the survival of individuals, communities and nations, and in the quality of life assessed at an individual or societal level. In the short term commitment to the environment implies deep shifts in the way we think and do business and the accountability of business to the larger community.

This research is designed to identify the founding priorities of CEDM and cast them into a form whereby environmental professionals learn what needs to happen and begin to think strategically about the man-environment relationship.

## **1.2 WHAT IS COMPREHENSIVE ENVIRONMENTAL DECISION MAKING?**

Comprehensive Environmental Decision Making, or CEDM, is an abstract idea of the future of man's relationship with the environment which, in the researcher's opinion, holds the greatest promise of providing the environmental professional with a rational point of view on man's relationship with his environment. Such a point of view is required as a foundation upon which an agreed system of environmental ethics can be developed. Specifically, subjective approaches, such as a biblically based concept of stewardship, do not carry conviction across social, ethical or religious boundaries. However a rational approach may convince and be incorporated in various social, ethical and religious contexts. Principles adopted by the professional direct the approach to the issues they encounter. By the

development of methods and tools based on particular principles, a route is established to the implementation of CEDM in the workplace.

A point of view begins with an understanding and organization of knowledge which eventually becomes general theory. CEDM is considered to be such a theoretical framework, useful to the professional in formulating principles or rules for environmental ethics that clarify basic environmental intuitions and provide guidance for education and decision making along with a rationale and justification for individual and organizational actions. This research places the professional within the business organization on the premise that organizations are the product of their members' thinking and interacting and that individual commitment can modify organizational policies and procedures.

In an evolutionary context CEDM is seen as a new paradigm that provides professionals with a world view better adapted to the problems they encounter. This paradigm is clarified herein by resolving CEDM's residual ambiguities and firmly founding the concept through a restatement of its origins. The research therefore presents CEDM as an emergent paradigm, in the sense of Kuhn (1970), through the identification, interpretation and rationalization of its attributes.

Because environmental professionals come from a wide variety of backgrounds and encounter many different issues CEDM cannot be transformed to a tight, rationally ordered set of rules that can be applied with great precision, but rather provides a theoretical framework in which the development and selection of appropriate methods and tools can take place and be facilitated. Clearly, development of such methods and tools is outside the scope of this research; the larger professional community bears this responsibility. However, it is hoped that this work will provide the professional and research community with a context such that CEDM can become a hallmark of essays, work products and future research.

Succinctly, this study is an explorer's stretch of a new continent of thinking on environmental matters and not a detailed map of the topography of individual issues.

### 1.2.1 CEDM Paradigm Today

"Comprehensive Environmental Decision Making: Can It Work?" was the title of Robert Bartlett's contribution to Environmental Policy in the 1990s, a collection of policy issues facing the political, social and industrial interests of the United States and of the international community. In his essay Bartlett concludes that:

Whether arguing for or against it, analysts do not agree on a definition of comprehensive (*environmental*) decision making. Few, if any, analysts formally define the term before using it. It is not uncommon to be able to identify a multiplicity of meaning by a single author; often, particular meanings may be implied for rhetorical convenience (1990, p. 244).

As Bartlett points out, *comprehensive* might mean including all or including everything, or simply to comprise, to include, to embrace or to contain. It could refer to a state of being or to a process. There is no clarity in degrees or types of comprehensiveness or what criteria should be met before the term is employed. Nor is it clear if comprehensive necessarily implies understanding.

*Environment* is an integrative concept that can include an array of social, political, economic and scientific factors. An environment might be limited to air, land, and/or water. It may include population at a description level or it may bring together a population's relationship to their surroundings. It may also be a static description of what exists, a dynamic description of evolution, or a process-based description of how and why evolution occurs.

Similarly, a decision may be collective or individual; a choice, a judgment or a conclusion made in an instant, or a process or series of decisions made over time. The questions remain: "When is a decision actually made?" and "If a decision is made does it

imply the process is complete?"

Using comprehensive to modify the word decision does little to clarify the situation.

Sometimes the term comprehensive decision making is used to refer to decision making based entirely on comprehensive analysis; other times it is meant to refer to decisions that are comprehensive in scope of their impact or in their breadth of their regard for values. Decision and analysis become almost hopelessly muddled in the literature on the subject (Bartlett, 1990, p. 245).

The problematic semantics discussed in Bartlett's thesis identified the ambiguity and confusion surrounding the body of attributes which is CEDM. Bartlett tells us there are a great many areas to explore for insights and lessons. The threads may be already there, or perhaps not, but he believes that all areas are inadequately studied. "The most salutary development possible in the 1990s would be for our ideas and concepts of CEDM to receive the attention or cultivation... needed to gain analytic strength or... sufficient clarity and force to influence policy" (p. 250).

Tufts University Center for Decision Making is also searching for decision making understanding and a good decision is generally described by Hugo Bedau (1991) as the alternative selected from a thorough set of alternatives. Such an alternative would be efficacious, implementable, ethical and optimal. In relation to the ethical aspects of environmental decision making, researchers conclude however that the "discussion has barely gotten underway" (p. 192) and that the parameters of the ethical concept have not been drawn. Their questions of how can we think effectively and what principles can be formulated continue to leave CEDM ideas open to research.

What is efficacious, implementable and optimal is receiving research attention through expert judgement, probability, utility and decision tree analysis, economic concepts of efficiency, resource allocation matrices and through policy analysis. Rational methods for decision making by individuals and groups have been developed there remains however no

resolution on the basic paradigm under which operations are being performed.

When asking scholars, policy makers, industrial managers and environmental professionals in the process of this research to define or describe CEDM, there was no consensus nor general understanding of the full dimensions of the idea. As a paradigm, CEDM is currently ill-defined and therefore inadequate as a worldview, yet no one denies the potential of the idea. CEDM appears to be at risk of abandonment because it remains a vague and abstract idea. This abstraction has limited the extent to which it has been integrated into strategic problem solving by important groups within the academic, government, environmental and corporate community.

### **1.2.2 CEDM Options**

The need to make decisions on environmental questions is increasingly vital, yet few people have the tools or knowledge to understand or appreciate them in all their complexity (Chechile, 1991, p. 2).

This research rejects the abandonment of CEDM. Rather the need is seen to build upon its historical significance by clarifying the concept so as to give a basis for improving environmental decision making from a professional's perspective. The importance and relevance of the subject area, despite the current state of abstraction and ambiguity, indicates that CEDM cannot be dismissed from the research agenda. As a theory, CEDM provided the framework for the National Environmental Policy Act (NEPA), America's environmental "Magna Carta." CEDM theory can be found in the new era of environmental reforms in the 1990s, perhaps none so universal as the globalization of the idea of sustainable development. Sustainable development, like NEPA's CEDM concept, has as a foundation the vision of a man-environment relationship based on a balancing of competitive economic growth demands with the need to preserve or enhance environmental quality. Sustainable development and strategic environmental management literature continues to prescribe a

"new way of thinking" but this new thinking has made, for example, little headway into the mindset or operational strategies of corporate America. Statements of the need for sustainable development do not replace CEDM but rather reinforce the need to clarify the CEDM paradigm as an explicit approach to achieving sustainable development.

If rejection of the idea is not an option, how is an emerging CEDM paradigm to be made sufficiently convincing to trigger the larger professional community to implement it through well-defined practices and procedures? Beyond acceptance, the paradigm's legitimacy must be tested and reinforced through application in an organizational context if CEDM is to bear fruit for the community of environmental professionals and the organizations in which they reside.

CEDM in its fullest paradigm form suggests an anthropomorphism of an abstract idea in order to achieve meaningful results.

The environmental professional often operates within a particular industrial context. Industry, the world of the technically dynamic, massively capitalized and highly organized corporate network, requires an appropriate formulation of CEDM, if it is to find acceptance. In this context, the environmental professional must provide a "way of seeing" that emphasizes both economic growth and environmental quality. The environmental professional is viewed as the "retooling" visionary (Kuhn, 1970, pg. 76) whose philosophy is that:

The most exciting breakthroughs of the 21st century will occur not because of technology but because of an expanding concept of what it means to be human (Naisbitt and Aburdene 1990, p. xxii).

In brief, the organization that provides goods and services satisfying a wide variety of economic and environmental desiderata will be better placed in the market place and more robust against changing priorities than one that is more narrowly based. The questions of an

emerging paradigm "What is CEDM?" and "Can it work?" are answered by an evaluation of guiding ideas, theories, methods and tools and ultimately through its fundamental meaning and practical applications which are closely related to:

Generalizations emphasizing that:

- Rational ethics and systems thinking can provide guidelines for human conduct.
- Government policy, based on sound science, can impact morality.
- Citizens have a key role in decision making.

Beliefs that:

- Values of an ecosystem are fundamentally based on rational ecology utility.
- The relationship of man to his environment, based on rational ecology, can be advanced by innovative and skillful use of NEPA and pollution prevention policy.

Values such as that:

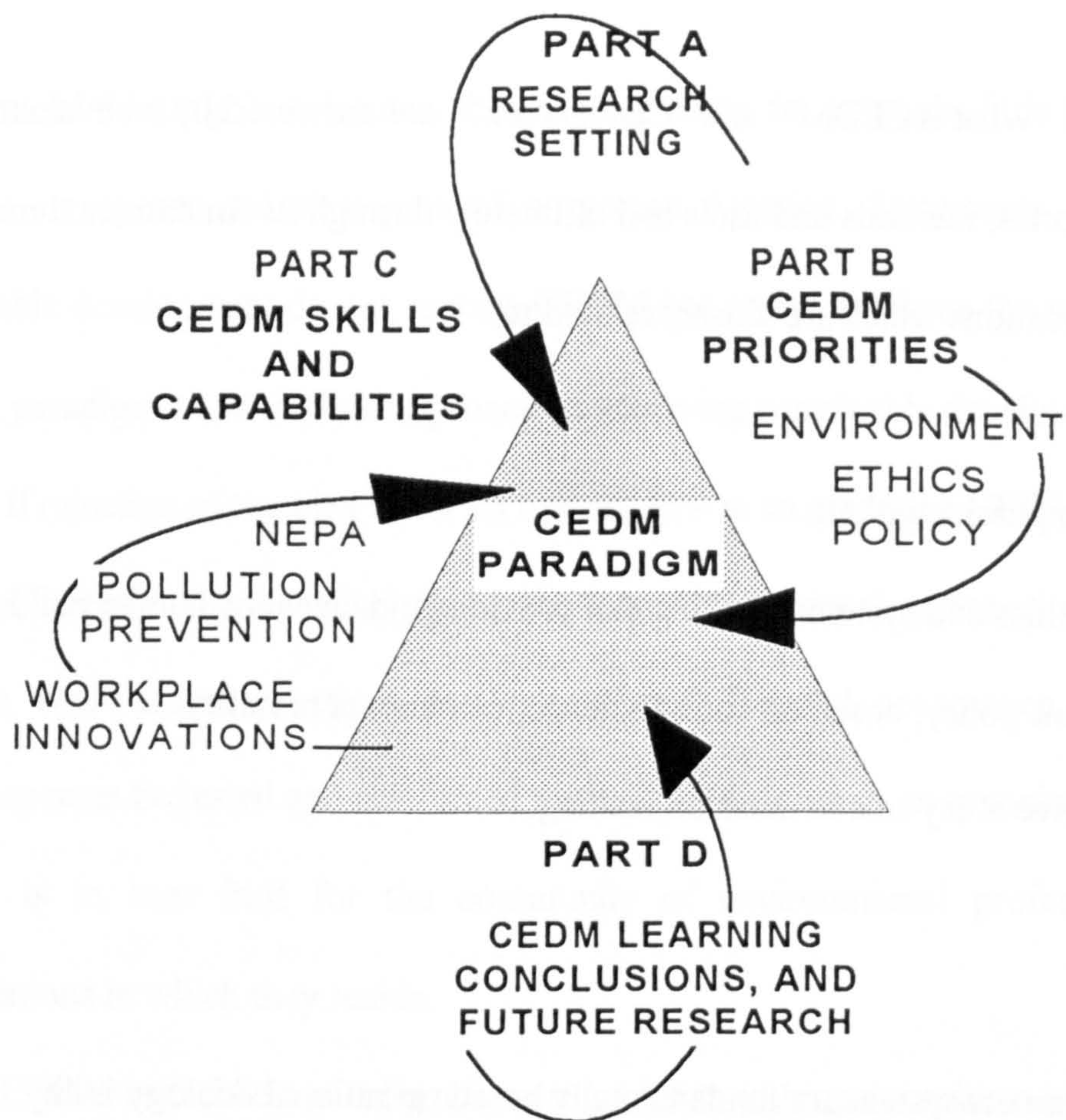
- The environmental professional has an obligation not to do harm.

This formulation of CEDM seeks to address a critical area of interest, i.e. how to present the paradigm so that it is embraced by the operational heart of America:

"The business of America is business."

The process flow chart outlined in figure 2 shows the research order and the areas investigated to reveal and clarify the attributes of CEDM.





**FIGURE 2 CEDM RESEARCH FLOW CHART**

To choose a limited scope from all the possible research avenues required a comparison of the understanding of CEDM now and what will likely be required to formulate CEDM as a foundation directing the commitment of environmental professionals in the future. Those research options that provided the greatest promise became the focus of the study. Setting other options aside does not imply that they have no place in CEDM research, they are only waiting in line to be explored by future investigators.

### **1.3 CONTEXTUAL REQUIREMENTS**

Several distinguishing features of the policy network and of the environmental professional have a major influence on this research. Specifically, an appropriate formulation of CEDM must take account of political realities as well as the system of environmental law, economics, society, the philosophical base of America's governing principles and the character of environmental professionals today.

### 1.3.1 The Environment And Politics

Since the 1960s when an idealistic generation put the environment on the public policy agenda we have developed a collection of environmental ideas, theories, strategies and approaches to experiment with in an attempt to protect the environment and to achieve economic growth.

The 1970s saw the responsibility for that agenda, as described in the National Environmental Policy Act, assigned to the Environmental Protection Agency (EPA). EPA's mission was and remains:

...to protect and enhance the quality of the environment by establishing and enforcing standards and regulations that ensure the public health and welfare and guarantee that property and ecological systems are safe from damage by environmental pollutants.

The EPA was envisioned as a government department that would respond to the need for a balanced growth policy and to the goals of the NEPA:

To create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA, Section 101).

It seemed at the time a logical, progressive and straight forward government agenda to approach the issues raised in the 1960s to ensure economic growth and environmental quality.

The politics of the environment have emerged through numerous avenues but perhaps none so evident as the proliferation of environmental laws and regulations. Environmental law in the United States has evolved into a system of statutes, regulations, guidelines, factual conclusions and case specific interpretations. A definition of environmental law offered by Thomas Sullivan (1993) concludes that: "The environmental law system is an organized way of using all of the laws in our legal system to minimize, prevent, punish or remedy the

consequences of actions which damage or threaten the environment, public health and safety" (p. 1).

The environmental command-and-control, liabilities-and-enforcement system of the United States covers all media and the goal of both current and proposed environmental regulations is to reduce environmental pollution. An examination of the United States system shows a federalism unmatched in any other industrialized country. (A summary of United States environmental law is included as an Appendix to this thesis.)

Environmental professionals deal with the law every day. At the very highest level, statutes and executive orders define the boundaries of job responsibilities. At the lowest level, rules and regulations provide guidance. Between the highest and the lowest levels laws are translated into practical requirements. The environmental ethic is obscured by a plethora of regulations and efforts to comply with regulatory requirements. Touting slogans such as "Designated Felon" and envisioning professionals (as well as corporate executives) behind bars, the environmental professional is focused primarily on regulatory compliance. Environmental regulation provides for civil and criminal law suits and the subsequent penalties and punishments have become the central factor of an environmental paradigm.

Despite the super abundance of regulations and the legal context of environmental integration in the workplace, by 1989 the state of the American environment was described by the New York Times as a "looming ecological crisis." What went wrong, when by the 1990s they tell us that "four out of 10 Americans live in areas where the air is often unhealthy to breathe, where 40 million Americans drink water that contains high levels of lead, where America's industry releases more than 20 million pounds of toxic substances into the environment" (Tolba, 1990, p. 2). In 1995, the EPA's report on national and regional trends in air quality showed increasing emissions in 1994 for all criteria pollutants except carbon

dioxide. The EPA associates the rise with increased economic activity, as well as increased on-road emissions due to higher vehicle miles traveled.

EPA's projections suggest that air quality will begin to improve within five years as the 1990 Clean Air Act Amendments begin to take effect. However, during this same critical time period we are beginning to hear "economic growth or the environment." It should not be surprising that environmental spending is being reconsidered in the United States where non-household pollution control expenditures are 9% to 76% higher than in most Western European countries for which comparable data are available (Carlin, 1990). If the pendulum swings and reverses the trend of the past 30 years to politically and socially embrace that idea, then the ecological and social crisis is closer at hand than anyone could have predicted.<sup>1</sup>

This trend reversal was frighteningly close to realization in the United States during the Bush Administration when Vice President Dan Quayle's Competitiveness Council attempted to strengthen its hold over United States EPA policies. This Council, a continuation of President Ronald Reagan's regulatory task force which was established to "spare" industry from excessive regulatory burdens, operated in a policy arena to which only the most astute policy followers pay attention. It certainly was not subject to significant scrutiny.

The Council, while flexing its muscles to stop environmental regulation in the early 1990s, was attacked by environmentalists and some members of Congress for what was perceived as undue meddling in the regulatory process. The meddling often favored industry without consideration of the impact on the environment. By 1991, a Senate panel was convened in an apparent massive expansion of Congress's ongoing probe of the Council's involvement in EPA rule makings. The Council was described by Congress as a "point of

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<sup>1</sup>The pendulum metaphor was described by Linda Glass of the United States EPA, Region 5, Office of Policy and Planning to the researcher in early 1992.

darkness" as it "used secrecy to undermine environmental law, and the public's right to open government," the two landmark environmental protection strategies of the American system (Clarke, 1992, p. 28). The Council was perceived by the EPA as the fundamental political threat to environmental quality in the United States in the early 1990s.

Although the Council's activities were of doubtful legitimacy, the economic, political and community issues underlying its actions cannot be dismissed.

In the mid 1990s, the environment remains the subject of debate. Sparing industry from government regulation remains a Clinton Administration priority. Decentralization and "smaller government" are a lead political initiative as is the struggle for government's financial accountability. "Smaller government" overriding a system where government regulation has historically provided the context for an infinite combination of operational strategies and technologies, suggests that some new paradigm must replace compliance as a way of seeing the environment and professional responsibility.

Scholars, industry and government alike have referenced a paradigm shift from compliance to commitment. The question remains open as to the origins of this commitment and the strength of beliefs and values supporting its realization. It is generally accepted however, that this new commitment paradigm implies a major change in the responsibilities of the environmental professional.

### **1.3.2 The Environment And Economy**

In the United States the regulatory command-and-control and subsequent remediation and restoration machine, while costing billions (\$115 billion a year in 1990 dollars), has fallen well short of its early expectations (Carlin, 1990, p. iii). Americans are beginning to realize that to effectively combat an expanding array of environmental threats without the nation going broke, the system must achieve better results from its pollution control dollars than it

is currently receiving (Scodari, 1991).<sup>2</sup>

The goals of the command-and-control approach are not being argued, and in the last thirty years many environmental objectives have been met. Science, technology and management initiatives are presenting us with some answers, but that is where the agreement ends. The command-and-control approach and technology alone have fallen into disfavor. Environmental management initiatives built around "compliance" without support from a broader commitment to an environmental ethic are not meeting expectations.

It would be incorrect to suggest command-and-control is no longer valid; it is. The United States does not intend to abandon the environmental protection system in existence since the 1960s. Unable to address social values and beliefs coupled with the need to be more cost effective, command-and-control regulations must be reformulated to address better the issues as they are understood today, addressing both economic growth and environmental quality.

### **1.3.3 The Environment And Society**

The United States is not alone in being confronted with the Tragedy of the Commons in its current approach to environmental management. Garrett Hardin's (1968) famous essay is confirmed through an impressive body of scientific and cultural data.

To somehow counter the tragedy, the challenge of this decade, according to William K. Reilly, EPA Administrator during the Bush Administration, "is to reconcile the expectations of the American people for greater environmental protection with our country's aspirations for growth" (Carlin, 1990, p. iv). To accomplish this there is a growing readiness to experiment with different approaches that will, according to Reilly,

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<sup>2</sup> For a further discussion see Government Accounting Office (GAO) 1988, EPA Protecting Human Health and the Environment Through Improved Management.

deliver in the most cost-effective manner the continued public health benefits of pollution control and assure that the natural systems that sustain human activities, including economic activities, continue to provide for generations to come (Carlin, 1990, p. iv).

In a country where "the business of America is business," Reilly warns us of the folly of allowing environment or growth to be perceived as mutually exclusive options in an American context.

The private sector controls extensive human and economic resources within its capital base. The types of environmental decisions made have a significant effect on the environment. The concept of the corporation's social responsibility is coming more to the forefront of management and environmental decision making. It involves changing notions of human welfare and emphasizes a self-interested concern with the social dimensions of business activity that have a direct connection with the quality of life in society. At present there are arguments for and against this responsibility, but what is not debated is the need to present proposals for the future and explore and inspire new concepts that somehow reflect an interconnected and interdependent approach to environmental management, with the associated implications for professional responsibility.

#### **1.3.4 The American Philosophy**

Utilitarianism is a doctrine that stresses the importance of utility or usefulness in decision making over any considerations of beauty or other value. It is a doctrine that dominates culture in the United States and makes essential the consideration of economics as well as environment in any broadly acceptable policy or approach to decision making.

The original concept of "utility" or utilitarianism as a framework for making decisions in a social democracy goes back to Jeremy Bentham, an 18th century British philosopher. In its application, the concept "assumes that all means find their justification in the ends they serve; the ends give utility to the means" (Etzioni, 1988, p. 24). Bentham argued that policy

makers should estimate the beneficial and harmful consequences of each policy and that the test of all legislation and institutions should be whether they maximize the happiness of the greatest number. Dissenting from Bentham, John Stuart Mill wrote of Bentham's philosophy that it "can teach the meaning of organizing and regulating the merely business part of the social arrangements. It will do nothing for the spiritual interests of society; nor does it suffice of itself even for the material interests" (Mill, 1840, reprint 1980).

In characterizing Western political theory concerning the balance between the claims of the individuality and society, Mill provided a restatement of utilitarianism on two fronts: one, that the health of its individuals is essential to the health of a society; and, two, that the majority enforce their wants and the power of the state secures it. According to the more humanist principles of utility, Mill understood that utilitarianism is not a sufficient principle for a culturally rich society. According to MacCormick (1982), the utility principle would only be advanced by those independent "truth-seeking individuals" that sought the moral grounds on which society would be established (p. 24). These individuals follow Mill's theory as they engage in discussion and experimentation through which the truth will prevail.

In this neoclassical philosophy it is assumed that individuals seek to maximize one utility, identified with an individuals' and others happiness in so far as it advances the individuals own happiness. This is a form of utilitarian ethics. Economics (normally associated with cost-benefit approaches) under this view will seek to determine a "price" that will make for the most efficient allocation of resources centered on self-happiness determined by a single measure of utility, understood or accepted as "healthy." Faced with the social complexities of morality, economists have assumed that utility can be used to rank order preferences notwithstanding the multiplicity of factors that determine the degree to which a commodity is desired. Unless one commodity outranks another in all relevant attributes it is



difficult to argue that its utility is necessarily greater. From the policy/regulation perspective of government two possible scenarios are:

- first, that it should abstain from establishing a single moral code for the whole, at least in the coercive forms of criminal law, allowing the community of individuals to collectively choose some "health" standard; and
- second, that it can employ the "harm principle" in an attempt to use its coercive power over any person in the prevention of harm to others, which ultimately involves establishing some standard.

Regulation in the United States has followed utility philosophy (inclusive of common law and harm principles) but has recognized some "universal values" through laws that enforce compliance obligations, such as emissions standards; and laws that are associated with "common law" environmental requirements. In "common law" environmental requirements "tort" is used to denote a common law civil wrong for which a court will provide a remedy. As an example in compliance law, the Clean Air Act states that "every American has the right to an atmosphere this is healthful to breathe which is in line with hundreds of years of common law. The "tort" concept is directly linked to the "harm principle" where it is a generalized legal duty to avoid causing harm to others, through acts of omission, as well as of commission.

Etzioni (1988), in proposing an expanded definition of "rational" utilities, fuses two concepts: one concerns the goal the other the means. The goal is to maximize the citizen's utility with a view toward happiness/pleasure and self-interest which are viewed within the broader context of human nature, society and ultimate values. Utility becomes a two-component measure based on happiness and moral worth. To follow this thinking, policy or any social choice mechanism would be implemented in such a way to maximize this dual

utility, with the goal selection a matter of ethical or value judgments.

Etzioni points out that a proper expression of utility theory associates costs with rationality. Early economic theories built around utility concepts assumed information was freely available and instantly absorbed and utilized through learning that was instantaneous and effortless. Information, learning and an infrastructure to convey that information is a critical element of utility philosophy. This is especially important to the environmental professional, where adequate data and time for learning are fundamental in operational strategies. As information has economic value and "time is money" it can be seriously misleading to neglect these points. As an example, in cost-benefit analysis there is a level at which it is not even worth thinking about potential changes in benefits. The time used would be better spent addressing completely different issues.

The most common adaptation of the traditional application of utilitarianism is accomplished through a cost-benefit analysis that seeks to quantify the beneficial and harmful consequences of an action where it can, and qualify those it cannot. This broad adoption of utilitarianism which tries to determine the greatest net balance of beneficial over harmful consequences provides a means of comparison among alternatives so choices can be made. The approach is not, however, definitive and the "cost" and the "benefit" criteria are invariably subjective, a matter that is extensively explored in standard textbooks on decision-aiding techniques.

Because issues of the inter-relatedness of the distributions of gains and losses, and questions of equity at the individual and community level are ignored, many argue that this form of utilitarianism cannot be used as the sole basis for environmental decision making.<sup>3</sup>

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<sup>3</sup> See among others Ortolano, 1984; Crandall and Lave, 1981; Lave, 1981; and Freeman, 1982 for a review of cost-benefit used for environmental planning and decision making.

Regardless of the long history associated with utility, determining utility remains one of the most difficult problems in decision making. Optimal utility judgements in a multi-variate context remain an issue in CEDM. The learning aspect of CEDM is fundamental in ensuring that utilities are determined rationally, even if the basis of their assignment can still be debated.

### **1.3.5 The Environmental Professional in the United States Today**

Most environmental professionals find themselves with either a pollution control orientation or an orientation toward ecology and are guided by natural resource laws and regulations. Seldom are the two combined and seldom are they linked to management and economics within the context of business principles. Rarely do the members of either group understand policy or policy strategies beyond a regulatory compliance mind-set. Sustainable development within the context of environmental decision making reflects little participatory actions. There is not a dominant certification or professional registration body, nor a consensus on education requirements. There is not a uniform ethic or accepted code of practice from which their commitment to a new paradigm may evolve.

Regulatory command-and-control compliance has become the paradigm for professionals. Regulation, however, is being recognized as providing diminishing returns. Regulatory decision making is often made with limited data and with considerable scientific and technological uncertainty. There is a need to set priorities and anticipate problems. Risk assessment has become one of the tools for setting new priorities. Although often crude and inexact, it along with utility nevertheless indicates several learning directions professionals should be engaged in.

Understanding interactions between systems is a central requirement for good risk analysis as well as strategic management Coordination between government, industry and the

community is an inherent element of risk communication and a recipe for effective action. Articulating long-range thinking and working to match resources and objectives is important for all aspects of the policy network. Personnel development at all levels is critical to developing good value judgements. Experiments are beginning to explore various means of reflecting informed judgements of environmental professionals. If professionals are to engage in future environmental decision making, learning is seen as critical to their discipline.

Learning also suggests a type of empowerment whereby individuals develop skills to deal with change. Principles of inclusiveness and accountability are viewed as critical learning skills required for sustainable development (Singh and Titi, 1995). Historically, command-and-control regulation that might have fostered empowerment within the environmental professional community seldom supported the commitment needed to promote the emergence of a new paradigm.

Despite their current state, professionals along with all policy makers, have a key role in the reconfiguration of environmental policy and regulation in the United States. This researcher believes that the environmental professional, operating under a new paradigm, is the best placed individual in an organization to influence important conditions and provide the environmental ethic leading to a industry based commitment that will successfully achieve and sustain environmental quality and economic growth. Environmental professionals can be effective agents of change by their interaction with both policy makers and the policy network. They are able to go into organizations, aid the organization in identifying its need for change, and assist in developing mechanisms for change. As a stakeholder in the policy domain, they can mobilize resources and produce an influence on policy that is without

precedent.<sup>4</sup> Today, environmental professionals maintain strategic positions within the policy network as consultants, in corporations, and as agency personnel. The environmental professional can be the educator, scientist, manager, engineer, or analyst. They can extend the debate beyond the workplace or business community, and ensure that relevant issues are fully and informatively debated in the public domain on behalf of the average citizen who lacks the time and resources to pursue in detail the environmental issues that impact his/her life.

Day-to-day the environmental professionals usually stand outside the structured academic and government policy research systems where much theoretical development occurs, but they are involved in the richness of academic, government, industry and social systems through which those theoretical developments are implemented. What better place for the continuation of the environmental revolution than within the ranks of those individuals who may well be a combination of the 1960s environmental activist, the disciplined technician, and the regulatory watchdog responsible for hundreds of ecological systems relationships within the government and industrial communities?

The National Research Council (1992) states: "It is important to give priority to studies that are relevant in the sense that they promise to shed light on decision variables that are actually or potentially subject to human control" (p. 41). Developing ethical and rational policy goals become subject to human control through learning and it is through the professional's commitment to a new paradigm that change is sought.

#### **1.4 THE UNITED STATES AND GREAT BRITAIN**

This research utilizes the experiences of the researcher as an environmental

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<sup>4</sup> See Doty, 1980; Dye, 1978; Etzioni, 1976 where they discuss the power of various stakeholders in the policy domain.

professional in Great Britain and the United States, but the focus of this research is not to make a comparative analysis between the environmental policies of the two countries, or the different modes of implementation associated with their distinct regulatory agendas. Both the United States and Great Britain have long histories of concern for the quality of the physical environment but they have taken different routes toward environmental policy, regulation and implementation strategies and are at different stages of development on the issues presented herein. Where government and cultural issues are relevant, the researcher focuses on an inherent government strategy, business management style, and organizational learning ability that can either advance or inhibit an individual's intuitive capacity for systems thinking.

A specific difference between the two countries is that Britain does not share the litigation and public information influence that has inherently impacted the American environmental policy and decision making process since the 1970s. The ongoing debate between citizens and the administration of the United States is largely achieved through litigation impacting on public decision making.

Neither does Britain share the regulatory control history of America, so any evolution of policy concepts could not be directly compared. Britain has emphasized voluntary compliance whereas the United States has taken a legislative approach. British regulatory authorities have demanded less, but because their demands have been perceived as reasonable industry and government are not perceived to have come to odds over regulatory compliance (Vogel, 1986).

As current regulations in Britain begin to require more of industry, as public information about the environment is made more accessible, and as international agreements cross traditional national boundaries, many future research questions will be raised about the effectiveness of Britain's volunteerism in the context of resources, motivation and regulatory

enforcement.<sup>5</sup> Certainly if the "mix" is not correct, the volunteerism of self-regulation will not be effective. If Britain is to remain on a volunteerism route, the incentives must be in place and the barriers must be recognized and removed.

Nevertheless this research, which is primarily focused on American experience and policy, can provide significant insight into policy concepts, agendas and modes of operational implementation that are of wider significance. This is especially true where a linkage is being made between the environmental impact assessment process and pollution prevention processes that have become international in concept but varied in implementation, operational understanding and practice. What is most useful to the environmental professional, and the private sector on which ultimate acceptance and implementation of a policy relies, is the recognition of the importance and usefulness of heightening the awareness of issues involved in CEDM, as the CEDM body of concepts and initiatives come to the forefront of the international environmental agenda.

## **1.5 ORGANIZATION OF THE DISSERTATION**

This thesis contains a total of twelve chapters divided into four parts. Part A, containing Chapters 1 through 3, provides an introduction to the study. Chapter 1 provides guidance on how the research was conducted and includes background on CEDM, the primary focus of the research, as well as describing the context of the research. Chapter 2 summarizes the objectives of the research—what the researcher set out to do—and Chapter 3 describes the methodologies employed to reach those objectives.

Part B presents findings from the four major areas of exploration: the historical beginnings of CEDM in Chapter 4; the role of ethics in Chapter 5; a discussion of the two

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<sup>5</sup> To further explore the differences in the national systems see for example Vogel, 1986 National Styles of Regulation and work by Cohen and Kamieniecki, 1991 and Ingram, 1990 which provide a good discussion on environmental regulation and the means for successful self-regulation.

key environmental policies in the U.S. since 1970—the National Environmental Policy Act (NEPA) and the Pollution Prevention Act (PPA)—in Chapter 6; and a discussion of three theories of man and environment relationships in Chapter 7. The problem-solving element in this segment of the study brings together the central intellectual resources that can be brought to bear on the research problem. Here the problem is defined and the methods of solution discovered. Chapter 8 provides a summary discussion of the principle findings of the problem exploration.

Part C contains two chapters which focus on testing the findings of Part B. A process of "testing out" some of the findings in Part B for their possible utility in developing and operationalizing a new CEDM paradigm begins with Chapter 9, discussing the application of rational ecology theory to NEPA and PPA. Chapter 10 presents another form of testing-out applied through case studies. The experience of the researcher in attempting to apply the earliest guiding ideas, methods and tools in Great Britain characterizes the first case study. The second case study again takes professional learning to the workplace and follows a compelling way of teaching, thinking about, and applying the CEDM paradigm.

In Part D, the contribution of the research to the development of learning and how to think about and apply CEDM is described. Chapter 11 provides a summary and conclusions. "What is CEDM?" and "Can it Work?" are the critical research questions dealt with through the developmental stages of learning addressed in this research. Limitations are presented in a way so as to stimulate debate and indicate potential future research directions.

Chapter 12 takes the research into a central debate over its application to sustainable development and its usefulness to environmental economics.

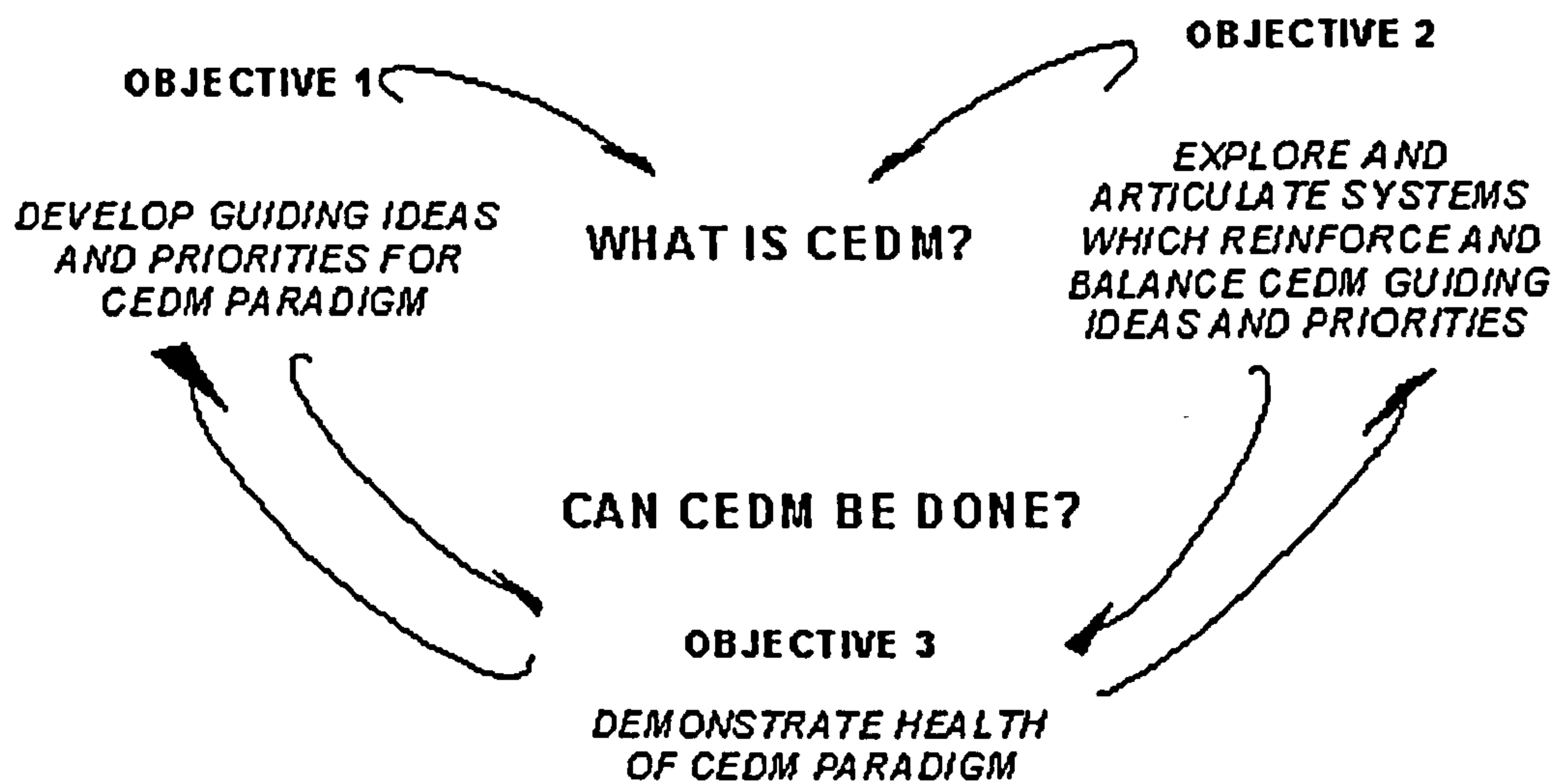


## **Chapter 2: RESEARCH OBJECTIVES**

In his final analysis, Bartlett (1990) concludes that "those responsible for trying to make environmental policy more comprehensive cannot really have any idea about what they are doing" (pp. 250-251). Responsibility in industry lies with top management to the shop floor. At all levels the assumption must be made that learning is required for people to come to terms with their changing responsibilities. This research described herein is related to the policy network of government and industry and focused on a central actor in that network, the environmental professional. Three primary objectives are addressed to answer the questions: "What is CEDM?" and "Can it (CEDM) work?"

- Articulate the guiding ideas and priorities for Environmental Decision Making that have been built on the original work of Lynton K. Caldwell. The objective is to define the core consensus on CEDM by asking the question: What are the guiding ideas applicable to CEDM?
- Explore and articulate the key system dynamics which reinforce or combat CEDM guiding ideas. Through this objective the research builds on the core consensus of priorities and attempts to characterize the supporting theory, methods and tools through which CEDM is understood and operationalized.
- Demonstrate the value of the CEDM paradigm in relation to professional commitment and applications in the workplace.

Figure 3 shows that these objectives do not have definite boundaries and have to be considered together, in the context of their interrelationships.



**FIGURE 3 RESEARCH OBJECTIVES**

If CEDM can bring the objective world of the sciences together with the humanities many of the issues plaguing environmental decision making can be resolved. The hypothesis of the research is that CEDM can be developed into an operational paradigm applicable to the 1990s and beyond. CEDM is assigned this role because it has the potential to be acceptable to both government and industry, because of its emphasis on both environmental quality and economic growth.

It is also the researcher's hypothesis that by emphasizing the role of the environmental professional in CEDM, industry is afforded the best chance of providing an appropriate response to Sustainable America: A New Consensus for the Future. This report, prepared by the President's Council on Sustainable Development, notes that the policy changes needed to achieve sustainable development will come from strategic environmental decision making in the workplace (The President's Council on Sustainable Development, 1996).

## **2.1 POTENTIAL CONTRIBUTION OF CEDM**

This research is driven from the researcher's own experience to achieve a greater degree of comprehensiveness in environmental decision making and in so doing provide for

a paradigm that directs and revitalizes the environmental profession. Moving from a compliance to a commitment way of seeing professional responsibilities presents professionals with some very interesting challenges. Will professionals remain on and continue to support the traditional role of environmental compliance as the focus of workplace decision making and ultimately society? Or, will professionals accept the need for commitment, and pursue a new ethic of professional responsibility? If a commitment ethic is possible are we willing to re-examine the societal perception of the role of those individuals called "environmental professionals?"

Ultimately, CEDM must "evaluate, order and structure incomplete knowledge so as to allow decisions to be made with as complete an understanding as possible of the current state of knowledge, its limitations and its implications" (Morgan 1978 and 1985). The research approach of evaluating, ordering and structuring using Kuhn's paradigm building concept is appropriate, when, as in this case, there is no universal consensus nor acceptance of CEDM. If it were easy to make good comprehensive environmental decisions, if there was no daily debate in our society on the nature and form of economic growth and environmental quality, there would be no need for this research; however this is not the case.

CEDM at the core of practice and professional responsibility provides professionals the opportunity to contribute to and take on a role as environmental stewards, in a way that has never been done. Thus, adoption of CEDM gives the professional the opportunity to take a larger world view.

Over time, the CEDM idea has become a "catch-all" spanning strategic planning concepts, multi-criteria decision-making, and optimization scenarios, to name a few. Inputting CEDM into a literature search data-base at California State University, Davis in 1992 provided over 1,000 entries. Yet the context of all the entries is abstract. Furthermore,

the various uses of the term CEDM are not related to any universal set of core ideas and concepts.

This researcher agrees with others, for example Chechile and Bedau at the Tufts University Center for the Study of Decision Making (1991) who contend that a rich appreciation of all the dimensions of the environmental issues would come to the table with the development of a more unified understanding of CEDM. At the level of the corporation, Tuft's researchers conclude that relatively little research attention has been paid to how companies and therefore the environmental professionals within those companies make environmental decisions.

However, some general comments can be made. At the corporate level, decision-making tools are generally associated with assuring regulatory compliance, improving cost analysis, and better tracking of information and improved communications. Environmental policy statements, principles of better compliance, conserving natural resources, waste minimization and better communication to a wider public are found on the agenda of many large companies. Management controls are used by many companies and professionals are familiar with, for example, organizational structures, environmental reviews and compensation schemes. Through an examination of previous case studies which are confirmed through the experience of the researcher on these types of issues and on current environmental management directions, an enhanced understanding has been gained of environmental decision making as it is currently, and could be, practiced.

Environmental decision making in the private sector is currently characterized by rapidly increasing sophistication. New ways of looking at old problems are emerging, with the caveat that companies are in the business of making money and this fundamental objective can never be compromised (Rapport and Dillon, 1991).

What continues to be missing from the literature is reflection on and direction of the basic learning paradigm that drives environmental professionals. The suggestion that there is a degree of consensus (beyond the need to achieve regulatory compliance) among environmental professionals is not borne out in the real world. The idea that some supporting paradigm for professionals is somehow "grandfathered in" is fallacious and reflects the fact that only a limited amount of research is conducted by individuals with relevant experience of the practices of private industry.

Research findings are often misapplied or unused when the natural learning disciplines are not encouraged. The research is often not used because it cannot readily be incorporated into the value system of the professional. Professionals must be afforded some way of learning how to think, whereby they will be able to bring together seemingly unbridgeable cultures.

Professionalization is also jeopardized when the learning projected by research is not set in the context of the whole. Learning disabilities (examined further in Part B) have been identified in the management literature, and they are no less devastating to professionals in the environmental field.

Adding an agenda of sustainable development to corporate decision making, Kleiner (1991) in the Harvard Business Review consolidates the thoughts of many when they say, "Despite mounting pressures to prove their (commitment) to the earth, managers share no common understanding of what this might mean to their own companies" (p. 38). There appears little advancement in 1996 when it is suggested that no clear (sustainable development) guideposts exists and while the environment is a central business issue few managers can specify what that means in terms of the ability to meet the needs of the present generation without compromising the welfare of future generations. Current research into

solutions would therefore begin with an appreciation of previous researcher's findings: "Clearly, today's managers lack a framework that will allow them to turn their good intentions into reality" (Walley and Whitehead, 1996). How professionals will let go of the old and capture the problem-solving energy of sustainable development is a demanding research question.

Business sector changes needed for sustainable development at the most fundamental level requires a shift of mind, not unlike that called for from the Massachusetts Institute of Technology (MIT) Commission on Industrial Activity (1992) and called for today through the continuing work of Senge at MIT. Commitment encompassing the whole of the environment has been called for by The National Research Council, which has requested research initiatives that spans the problems of theory and method, data quality and interpretation, and human resources and organizational requirements; all basic requirements for sustainable development's integration into business. Linking the recognized need for research with a call from both the environment and corporate management communities suggests that changes in workplace decision making are on the horizon.

There is also the need for global cooperation to provide international policy and operational initiatives that capture the character of CEDM. Integrated international environmental policy and management is on the agenda of the United States, the European Community (EC), developing countries, the United Nations and global organizations. This call at the highest levels was reflected in the 1972 Stockholm Conference on the Human Environment (see Caldwell, 1984, p. 297 for a reference listing of the Conference) resulting in the famous Stockholm Declaration and the establishment of the United Nations Environment Program by the General Assembly of the United Nations in December, 1972. The United Nations Conference on Environment and Development (June, 1992) again

recognized the need for international organizations to keep environmental matters on the agenda and for global response to environmental issues.

Reilly (1989a) described such an international agenda as "a huge job in trying to overcome the political, economic, religious, and cultural differences that have separated nations for hundreds of years" (p. 352). An increased knowledge of CEDM, provided through any avenue, can help in this undertaking whereby policy actors may seek to achieve CEDM by organizational linkages and broader implementation of policy instruments.

Some universal core of guiding ideas would prove beneficial to environmental professionals. Creating an emergent learning paradigm for CEDM as a well-defined entity extends the understanding of environmental decision making beyond the content or outcome of the decision by establishing the interfunctional linkages between guiding ideas, theory, methods and tools, and innovations in infrastructure. The research traces the cognitive structure of CEDM priorities and moves those priorities into functional areas.

This research provides a tool that will help ensure a future that will meet human needs and wants in an environmentally sustainable manner. Furthermore, it makes an important contribution to environmental management by expanding the scope of the professional's responsibility from compliance with environmental regulation to commitment to the environment. Commitment suggests a change in the professional's interpretation of the world. What commitment means is articulated through the development of the CEDM paradigm.

Operationalizing issues are the direct concern of the environmental professional who routinely deals with policy objectives by interpreting and implementing them within the organizational/industrial setting. The environmental professional is the regulatory manager, technical advisor, trainer, policy interpreter, and procedures coordinator; the key instrument in moving policy goals, as they are understood, from the policy maker into the policy

operational network. The operational network is calling for new models of relationships. This research promotes such a new model.

The CEDM paradigm is called for as the point of clarification for environmental intuitions, and as a guidance for empowerment, education and decision making.

Reilly (1989a), calls for a change of direction. Writing in the Yale Journal on Regulation, he asks environmental professionals to take a fresh look at environmental laws that have historically been the cornerstone of the professional management strategy, and begin to think in terms of systems, incentives and multimedia approaches. He tells the professional to ask environmental questions not in terms of getting rid of some particular and often isolated pollutant but rather to ask, "Where is the most efficient place to intervene in the system" (p. 354). This research suggests that the primary need currently is for intervention at the level of the environmental professional's paradigm, as this determines their way of seeing and working. A paradigm change at the level of the professional is put forward as a critical contribution to systems change thereby providing a significant contribution to the common good.



## **Chapter 3: METHODOLOGY**

This chapter will present a summary of each of the four individual theories applied in this research. A synthesis of the theories provides a final perspective on the research methodology. This research project, in its broadest sense, uses an ethics-driven research objective to focus on an abstract public policy idea which it follows from inception through to operational instruments useful to professionals today. Theory supporting this research comes from four areas:

- **Appropriate Research Fit Theory**
- **Policy Research Theory**
- **Learning Organization and Systems Thinking Theory**
- **Paradigm Building Theory**

### **3.1 APPROPRIATE RESEARCH FIT**

The first research issue that arises is the question of an appropriate research fit between researcher and research. To yield the maximum usefulness, three basic components are required:

- the researcher needs theory and knowledge in the particular substantive area;
- the researcher should be able to operationalize program effects and objectives;
- the researcher should be able to incorporate perspectives on the program and policy context into the design (Maynard-Moody and McClintock, 1981).

In this case, the research makes use of the researcher's 30 years of professional experience including 20 years as an environmental professional, observing and working within the policy networks and organizational structures of the business community. Focusing on what works best to bridge knowledge and decision making, useful results has been more readily achieved when the researcher had an established position within the

implementation context of the network. The research is therefore directed to the understanding and implementation of CEDM by professionals in a business context.<sup>6</sup>

### 3.2 POLICY RESEARCH THEORY

The second research aspect leads directly to the reinforcement of the need for understanding in the advancement of CEDM. The research looks at the operational instruments and implementors as a part of policy making, which is where the direction of public policy is established (Palumbo, 1988). Robert Bartlett, during a phone conversation in early 1992, suggested that CEDM can best be understood by following the direction of Hanf's scholarship. This point deserves emphasizing in the sense that it is implementation by the many, not the radical thinking of the few, that sets the tone of an age, culture or community.

Hanf and Toonen (1985) describe appropriate policy research methodologies in their introduction to a policy workshop held at Erasmus University in The Netherlands. They stress the importance of policy study methods which respond to the increasing diversity and complexity of organizations developed to meet the demands for public goods and services. Sabatier and Hanf (1985), Sabatier and Mazmanian (1983), and Lester (1989) following similar themes encourage looking to context, to the policy contributors, and other major actors to reveal the policy design and goals. It is only with such understanding of the "goal" that the professional can follow through with the "means" relevant to an operational context. Hanf and Toonen (1985) among others have also suggested that policy is dynamic and should be examined in the context of its evolution over time.

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<sup>6</sup> Previous work by Carroll *et al* (1988) provides for a level of study which can allow theory to build-up from the level of the individual to macro-level collectives. While there is no presumption that all 'environmental professionals/practitioners' share a common ethic it is nevertheless suitable to suggest there is some degree of consensus as to values, ideology and interests that can be built upon.

The direction of policy research theory, emphasizing the complex network behind public policy, is clearly supported by reality. When asked: "Who was in charge of environmental policy in the United States?" Dawson (1988) of the United States Office of Management and Budget referenced that current environmental policy has evolved over time and that it is based on a mix of policy, tradition and programs from an earlier period. Answering the same question, Hill (1988), from the Council on Environmental Quality, paints a picture of the executive branch, the legislative branch, the judicial branch, environmental groups, industrial groups, and concerned citizens.

### **3.2.1 Prescription and Implementation Studies**

Policy research theory is subdivided into two types of studies, prescription and implementation, each of which places a different emphasis on the research effort. Policy prescriptions through evaluations were first thought to be the beacons for policy professionals. Studies in the late 1960s by Campbell (1969) were directly related to prescribing methods for solving problems. The most disappointing aspect of such evaluation has been its dismal record of utilization. There are a number of reasons for this, but the major problem described by Wholey (1977) is that the issues and goals of the evaluators are not the same as the policy makers, and that evaluations rarely offer suitable recommendations for policy makers. Maynard-Moody and McClintock (1981), among others, concluded that researchers used strategies or traditions in research that were more suited to a laboratory than to real world policy dynamics.

Since its emergence in the 1970s, implementation studies have acquired two major perspectives to explain the way policies are implemented. The "top-down" view suggests that implementation is carried out by the policy decision makers and by law, while the "bottom-up" approach focuses on the establishment or evolution of policy that allows for flexibility

(Sabatier, 1986; Hogwood and Gunn, 1984; Browne and Wildavsky, 1984; Sabatier and Mazmanian, 1980; and others). The "top-down" analytical works focus on the front-end of the policy process, while the "bottom-up" perspectives tends to focus on implementation.

This research looks at current and past policies to find the sources of ideas. Knowing the seeds or principles of ideas relating to economic growth and environmental quality gives the potential to resolve a variety of issues.

### **3.3 ORGANIZATIONAL LEARNING THEORY**

Management and business development theories abound in the literature and within particular business communities. Management theories that reflect both economics and the environment are more limited, however, but with understanding and creative implementation within the business community they provide a key component for economic growth and environmental quality.

The methodology employed in this research adapts organization learning theory through use of several key disciplines. These disciplines, most recently advanced by Senge (1990) at the MIT direct individuals, management and employees alike to realize their highest aspirations through:

- Systems Thinking
- Personal Mastery
- Mental Models
- Building Shared Vision
- Team Learning

The assimilation of these disciplines within the business organization has the potential to enhance what Senge calls a "new wave of experimentation and advancement" (p. 11).

The subject matter addressed by Senge combined with the overall methods employed do not suggest that his research provides the final words on learning in an organizational context, but rather the first phase of learning individual practices, principles, and state of being.

This first phase is addressed around the architectural triangle of learning guiding ideas, theoretical methods and tools and innovations in infrastructure. The work at MIT has promoted ideas of management that can be readily integrated within the environmental professional's frame of reference. For example, the primacy of the whole, a key identification point of CEDM, is one of the key guiding ideas relevant for all efforts to build learning within organizations.

### **3.4 PARADIGM BUILDING THEORY**

This research follows Kuhn (1970) in his argument that a paradigm is created and sustained through understanding, procedures and applications that are as necessary to science as rules, laws and theories. The theoretical directions and study findings all feed into Kuhn's framework for paradigm building. Kuhn's research references the constituents of a paradigm as: symbolic generalizations that have the attributes of concept-determining functions; models which describe fundamental characteristics; and values which determine the underlying decisions made in favor of certain alternatives.

The development of the paradigm concept follows the flexibility afforded by Kuhn and is generally interpreted in its broadest sense. The paradigm is outlined first in theory, but it is reinforced and enriched as its implications are discovered in practice. Certain aspects may only be clarified when working through to implementation. The CEDM paradigm advanced aims for a consensus status among environmental professionals. This consensus would evolve from its application and recognized usefulness in strategic environmental decision making.

Professional judgements would ultimately develop as concept-determining actions throughout the professional community.

As a model CEDM carries certain characteristics and relationships. These characteristics help to determine whether a concept, method, or action is consistent with CEDM.

The value orientation of this research allows for a great deal of variability in application and interpretation. At the level of the individual, the researcher as part of the environmental professional community, aims to change the opinion of the professional community by showing that the CEDM paradigm advanced has better problem-solving capabilities than the current approach. The research further addresses a particular set of shared strategic environmental decision making experiences shared by the professional community. Overall, the paradigm elements form a whole and are presented to function together.

Kuhn's paradigm building also addresses instruction and training relative to the notion of progress in the sciences. In this respect, this research addresses gaps in the professional's normal areas of study and encourages an overview of learning from a different and broader view point. The employment of the knowledge gained in this research provides access to alternatives ways of viewing environmental problem-solving. Individual differences are encouraged in an attempt to capture the full dimensions of how an environmental point of view guided by the paradigm presented can result in fruitful commitment and implementation in the workplace.

The need to encourage emergence of a CEDM paradigm that gives the environmental professional the knowledge to provide a solution to the problem of achieving economic growth and environmental quality sets this research firmly in the context of Kuhn's

philosophy of major advances in science occurring through paradigm shifts.

### **3.5 SYNTHESIS OF METHODOLOGICAL THEORY**

This research is concerned with moving an abstract idea (CEDM) into the understanding and operational forum of a particular disciplinary group (the environmental professional).<sup>7</sup> This calls for a great deal of information transfer along with analysis and interpretation where reframing and reorientation are stressed. The combination of information and analysis strengthens problem exploration by providing the environmental professional's CEDM paradigm with the background necessary to first establish a way of seeing and understanding and then to take action based on that knowledge of CEDM. This demands that the methods employed produce results which articulate the issues and information clearly, with paradigm building coming from critical examination, analysis and operational implementation.

The multidimensional aspects of this research requires it to transcend disciplinary, organizational and theoretical boundaries, and to employ methodologies that allow for maximum flexibility. In order to do so, the study uses the basic attributes of policy research which has an orientation to action or implementation and a fundamental concern for a social problem. There are no straightforward rules for such research, as the methods vary with the problem being addressed and with the style and judgment of the researcher (Majchrzak, 1984 and Wildavsky, 1979).

The credibility of this type of qualitative research is often challenged and labeled as "unsystematic," "impressionistic," or "unsophisticated." These critics, in their zeal to discredit flexible research have forgotten the diverse and complex nature of the social sciences and

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<sup>7</sup> As they are gaining rather than losing influence (Dye, 1978), the environmental professionals are an appropriate group to target.

instead continue to seek verification where it may not be achievable. In this type of research, an accurate research fit and relevance to the area it purports to explain are the most important criteria for rigor (Glaser and Strauss, 1967). While still maintaining flexibility, Majchrzak (1984) describes five characteristics of this type of research. Specifically such research:

- is multidimensional in focus;
- uses an empirical-inductive research orientation producing a research process whereby information and paradigm building are constantly interchanged;
- incorporates the future and the past;
- responds to study users; and
- explicitly incorporates values (p. 18).

Building on Caldwell's CEDM paradigm, the research employs a qualitative assessment strategy in a focused synthesis with primary and secondary analysis (Doty, 1982). This includes discussions with experts and various stakeholders, personal experience, review of memos/speeches, government documents and regulatory/policy instruments, published and unpublished documents and literature. Testing out applications of theory and case assessments provide additional analysis and ultimately lead the study toward action research (sometimes called evaluative research), where the researcher is actively involved in some aspects of the topic understanding and, using the researcher's experience, an evaluation is made of those aspects. As a "think piece" (Doty, 1982), or as an investigation using this information to establish and challenge a paradigm in crisis, as provided for by Kuhn (1970) this method yields the qualitative approach to CEDM issue exploration.



## **PART B**

### **CEDM PRIORITIES AND OPERATIONAL LINKAGES**

Part B of this research presents the essential investigations and findings. Chapter 4 provides the background to CEDM through a brief biography of its originator, Lynton K. Caldwell, and an interpretation of CEDM is formulated from its founding ideas. Chapters 5 through 7 present the critical functional areas and the various levels of supporting theory necessary for the evolution and operation of a CEDM paradigm. Guiding ideas, theory, methods and tools, and innovative operational infrastructures are investigated and key learning elements consolidated to arrive at the generalizations, beliefs and values associated with paradigm development. Chapter 8 concludes this part with the paradigm elements presented as a way of seeing professional actions and responsibilities.

#### **Chapter 4: THE ORIGINS AND PRIORITIES OF CEDM**

Caldwell is generally given credit for first linking the terms "environment," "policy," and "comprehensive" in a 1963 Public Administration Review article. His central theme was the need for environmental policy to be comprehensive:

Americans...have seldom seen environment, as such as an expression of anything particular. They have seldom thought of it as a general object of public policy. Their readiness to control environment for particular purposes has not been accompanied by recognition of a need for comprehensive environmental policies...a policy focus on environment in its fullest practicable sense would make more likely the consideration of all the major elements relevant to an environment-affecting decision. Whatever content is ascribed to the adjective "good," it becomes daily more evident that public administration of the environment will not be "good" if it fails to deal with environmental problems in comprehensive terms (pp. 138-139).

Caldwell's call for "good" public administration occurred when ecological principles and the identification of environmental crisis demanded new and more comprehensive

coverage of social issues within environmental policy. It was an embracing idea which appeared to integrate and consider the crucial relationships of a whole ecosystem (Bartlett, 1990).

#### **4.1 CALDWELL'S BACKGROUND AND FACTORS THAT PREDISPOSED HIM TO FORMULATE CEDM**

Caldwell, born in 1913, is Professor Emeritus of Political Science and Professor of Environmental and Public Affairs at Indiana University. As an "environmentally oriented" political scientist in the early 1960s,<sup>9</sup> Caldwell transcended traditional boundaries of political science as a discipline and sought to incorporate the knowledge of other fields into his writings. His route of access into the environmental field was to establish and participate in the political struggle for a better physical environment through the adoption of ecological values (Lester, 1989).

In doing so, Caldwell follows the social science investigation theories of Taylor (1967) which state that political science, once it goes beyond the mere collection of data, must develop theories embodying "explanatory frameworks." Such frameworks involve a set of assumptions about the relative importance of different causal variables. In the case of Caldwell, these were basically the political and social relations. The follow-on theories depict the limited number of social and political arrangements that are compatible within a specific framework.

Caldwell has dealt with various aspects of environment policy in the United States and at the international level, offering an international perspective and response to

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<sup>9</sup> Additional political scientists writing on environmental matters would include Vincent Ostrom, Grant McConnell, Dean E. Mann, Norman Wengert, James Sundquist, and Philip Foss, among others, as described in Jones, 1972.

environmental issues.<sup>10</sup> While his scholarship is relevant internationally, he is best known for his works in the United States. His participation in government and policy making, directing the environmental agenda in the United States and ultimately throughout the world, is without precedence. It is Caldwell's CEDM theory applied to the United States public "policy" network in the 1970s that provides the foundation for this research work.

Caldwell's earliest works were associated with his reviews on Alexander Hamilton and Thomas Jefferson and their theories on public administration in the United States. These theories provided the core for Caldwell's later philosophy on government actions in regard to the environment. In The Administration Theories of Hamilton and Jefferson (1944), Caldwell described the Jeffersonian hope that political parties should foster those important civic qualities like virtue, breadth of vision and solidarity. Government was to operate at a level and character readily understandable by the common man with the public functions performed at a local and state level. Caldwell's attitude of government can be epitomized by a quote from President Andrew Jackson at his first annual meeting to Congress:

The duties of all public officers are, or at least admit of being made, so plain and simple that men of intelligence may readily qualify themselves for their performance (Caldwell *et al*, 1976, p. xxviii)

and by Thomas Jefferson, who wrote:

The article nearest my heart is the division of countries into wards. These will be pure and elementary republics, the aim of all of which taken together composes the State, and will make of the whole a true democracy as to the business of the wards, which is that nearest and daily concern. The affairs of the larger sections, of counties, of States, and of the Union, not admitting personal transactions by the people, will be delegated to agents elected by themselves, and representation will be submitted where personal action becomes impracticable (Daly and Cobb, 1989, p. 17).

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<sup>10</sup> See, for example International Environmental Policy, 1984 which offers an examination of the evolution of environmental concern and activities as a whole; and United States Interests and the Global Environment, Stanley Foundation, 1985. As of 15 September, 1994, his secretary will tell you "I can not keep up with his publications."

This "vision" of government characteristics and responsibility remains a significant issue with Caldwell throughout his works.

While the government's responsibility was awakened, so too were the public and citizenship obligations formulated in the early years of the American republic. This opportunity and obligation, while recognized as more complex than in the early times of America, was seen by Caldwell as an integral component of his ideas. His concern with the interactions between government and societies as they "learn-up" to the challenges and lessons of interdependence in the biophysical universe was described in the early 1960s, and remains on his agenda for study and call to action (1964, 1989, and 1990).

Caldwell recognized the political psychology of the time, in that the significance of the environment was not necessarily derived from scientific findings. Beliefs rather than facts shape issues, and that an interplay of scientific, technical, economic and psychological factors was needed to enlarge the human perception of the environment. Caldwell's distinction for CEDM embraces the primary responsibility for the individual to act.

#### **4.1.1 The Political Influence of the Time**

Caldwell's focus on the broader concept of the environment is aligned with the environmental movement in America (1963 to present), as contrasted to the conservation movement in the earlier part of the century. The ideology of the conservationist, as proposed by the likes of W. J. McGee, Gifford Pinchot, John Wesley Powell and Frederick Newell, under the administration of President Theodore Roosevelt (1901-1909), asserted that natural resources were to be used and developed and not left untouched as preservationists such as John Muir preferred. The conservationist's theme set the context for the basic United States public policy position from the 1920s to the early 1960s and was related to the strong interest in private economic development throughout the country. This was an era of unrestricted

growth; pollution and/or destruction from growth was not perceived or understood as a problem.

The environmental movement arose in the early 1960s, and the principles forged initially in the Roosevelt era began to fade as air and water pollution problems came more into focus. With the presidency of John F. Kennedy (1961), new ground was broken and measures for strengthening Federal involvement in pollution "control" measures accompanied by preservationist's values were devised. Under Interior Secretary Stewart Udall, the Kennedy administration took the lead role for the further development of a "new" natural resource public policy. Udall remained in the government under President Lyndon B. Johnson (1963-69) promoting the values in which he believed. His ideas were detailed in his book, The Quiet Crisis (1963) which tells the land story of America and the changing attitudes of those who have used it. The broader ecological overtones of the book found themselves manifest in the early pollution control legislation, and the first official recognition of preservation values within planning standards and procedures for water and land resources. The message of the mid-1960s reflected by President Lyndon B. Johnson (Congressional message to Congress, February 8, 1965) completed the transformation in philosophy and practical political concern. It is in this transformation era that Caldwell found himself in the 1960s as he developed his concepts and framework for CEDM:

For centuries Americans have drawn strength and inspiration from the beauty of our country. It would be a neglected generation indeed, indifferent alike to the judgement of history and the command of principle, which failed to preserve and extend such a heritage for its descendants...a growing population is swallowing up areas of natural beauty with the demands for living space...modern technology which has added so much to our lives can also have a darker side. Its uncontrolled waste products are menacing the world we live in, our enjoyment and our health. The air we breathe, our water, our soil and wildlife are being blighted...by poisons and chemicals... Our conservation must not be the classic conservation of protection and development. Its concern is not with nature alone, but with the total relation between man and the world around him. Its objective is

not just man's welfare but the dignity of man's spirit (President Lyndon B. Johnson, 1965; in Lester, 1989, p. 34).

In the President's last message to Congress (March 8, 1968) he again highlighted the crisis of choice:

Man—who has lived so long in harmony with nature is now struggling to preserve its bounty. Man—who developed technology to serve him is now racing to prevent its' wastes from endangering his very existence. Our environment can sustain growth and nourish our future, or it can overwhelm us. History will say that in the 1960s the Nation began to take action so long delayed (President Lyndon B. Johnson, 1968).

#### **4.1.2 Caldwell's Development of the Political Ideal**

Agreeing with the general political message, Caldwell underscored the importance of CEDM in 1964. CEDM is intended to bring

our understanding of the biophysical environment and our role in it into line with our capacity to alter it irreversibly, possibly for the worse. In the opinion of many of our most reputable scientists, we risk the disaster through well-intentioned but ill informed efforts at large scale manipulation of the biophysical environment (p. 6).

Following his identification of the need, Caldwell began to describe the means by which the concept could become operational. His early ideas centered around better planning, and according to Caldwell, CEDM was to provide an early means of analyzing environmental problems at three different but interrelated levels:

- first, in the way man sees his relation to the external world;
- second, through information and knowledge of ecological or environmental relationships; and
- third, at the level of operations, i.e. the means by which knowledge can guide decisions about the biophysical environment (1964, p. 6).

Perception, information and operational insights were to provide the framework for his subsequent clarifications on the subject.

Throughout the early 1960s, Caldwell published numerous papers on these subjects and developed his comprehensive themes through works which are represented in the bibliographical references of his 1964 work. His coverage dealt with the politics and public administration of man and environment relationships. Beyond scholarship, he initiated support, with funding from the Institute of Training for Public Service, by developing training courses for local civic leaders (Government in Action), and for government executives (Program Formulation and Development). The 1960s witnessed a growing maturity in Caldwell's academic works and in his activism in government policy making.

Caldwell can also be found at the Conservation Foundation under the leadership of Russell Train in the 1960s. As part of a small advisory body, Caldwell worked within the Foundation to develop ways in which environmental values and considerations could be brought into the decision making and policy making process. By 1967, the Senate Interior Committee, then chaired by Senator Henry "Scoop" Jackson of Washington, was considering environmental issues and how to build environmental considerations into government decision making.

The Committee asked the Foundation and Professor Caldwell, to follow-up on this theme. In 1968, the United States Government Printing Office published Caldwell's works that set the precedence for the first government policy explicitly addressing ecology. The "National Policy for the Government," a report on the need to set policy with an explanation of its purpose and content, and the means to make it effective, set the innovative policy standard for CEDM. By the end of the decade, Caldwell had become a central figure and the principal architect of the conceptual framework of the National Environmental Policy Act (NEPA).

Caldwell is credited with developing the framework of NEPA that started its political

journey in 1967 and passed the Legislature in 1969. Caldwell's role in NEPA's policy formation represented a "unique and non-partisan role by a political scientist in public affairs" (Lester, 1989; p. Notes). Caldwell's emphasis on the importance of an "action-forcing mechanism" provided the impetus the Jackson committee needed to include such a mechanism in the Act. Describing the Act at the time, Caldwell (1970) thought that the United States entered the decade of the 1970s committed for the first time as a nation to accepting responsibility for the quality of its environment. At the time, he clearly saw NEPA as a means of analyzing problems in a policy perspective based on a perception of what is of value, as well as providing information to support actions, within an operational context, that would establish "man in harmony with nature," as advocated by President Johnson.

The enactment of this Act did not lull Caldwell into a false sense of achievement for a form of CEDM where, through "regulatory decree" government and society would adapt to principles and policy objectives. Nor did the enactment of NEPA diminish his scholarly inquiry into the full implications of his concept. As the 1970s progressed, it became clear that NEPA implementation apparently did little to alleviate his concerns or to clarify the direction for the United States Environmental Policy. Society and government were faced with a conflict between wanting what NEPA set forth and a lack of capability to make it happen. With the integration of CEDM parameters becoming a recognized problem for the bureaucratic structures in America, Caldwell called on administrative organizations to provide the lead and support the concept of CEDM throughout the system.

In 1972, Caldwell stated in his book, In Defense of Earth, that to cope with the major environmental problems there is a need for administrative organizations to be:

- sufficiently comprehensive to encompass the problems under attack;
- facilitators in the coordination of all related efforts;



- adaptable to the dynamics of environmental changes and to progressive stages in the solution of environmental problems;
- capable of obtaining, evaluating, and applying the appropriate science and technologies to the problems at hand (p. 200).

Caldwell's interest and emphasis on the role and responsibility of the private individual continued to drive his scholarship for citizen involvement in the policy process. The study of NEPA by Cortner in 1975 for example, describes the NEPA clientele (environmentally-concerned citizens) as slowly eroding. Seeking to provide some grounds for optimism, to keep the idea alive, Caldwell *et al* countered such findings with Citizens and the Environment: Case Studies in Popular Action (1976) in which he affirms and illustrates the vitality and feasibility of the public process. In a world where the "people are finding it hard to retain a sense of participation in public affairs" (p. xi), case studies are presented to show that citizens can improve the quality of their environment.

The 1970s saw an increased interest in the vitality of self-government and the role of the self-regulating citizen at the local level, as well as on administration of the environment that can produce well-balanced programs in which ecological and environmental factors are an integral part. During those years, the environment was at its high on the political agenda of President Richard M. Nixon. He was sending strong messages to Congress for action to deal with water and air pollution and solid/hazardous waste disposal. Administrative changes were called for with an environmental reorganization within the executive branch. The Environmental Protection Agency (EPA) was established in this period as the focal point for environmental protection. The decade saw ecological theory expressed in political reality, albeit imperfectly, with, for example, passage of the Clean Water Act and the Endangered

Species Act.<sup>11</sup>

This decade also saw the predominance of Caldwell's works providing "how to" implementation guidance on coping with the issues at hand by applying ecological principles to the "prediction of crisis" messages surfacing from around the globe. Barry Commoner's The Closing Circle—Man, Nature, and Technology (1972), Politics and Ecology (1972) by Philip Foss and E.F. Schumacher's book Small is Beautiful: Economics as if People Really Mattered (1973) reflected the intellectual thinking of many contemporaries. Caldwell's consistent message of comprehensiveness and a call for the force of new ideas to become operational through institutions and people, was eloquently outlined in his own work, In Defense of Earth: International Protection of the Biosphere (1972).

The 1980s brought a different environmental and political mood to the country. The Ronald Reagan administration "sought to reverse what had been more or less a consistent support by past presidents of both political parties for an increasing array of measures to enhance environmental quality and environmental protection" (Caulfield, 1989, p. 46). During this political era, it was only in the courts that environmental concerns and issues continued to be generally advanced. Caldwell's Science And The National Policy Act (1982) set the descriptive pace for his work in the 1980s and combines the "how to" of policy with the basic message of survival during a political era which saw little merit in CEDM policy. Caldwell's survival stance was valid for the 1980s when the political forces drastically reduced the scope and effectiveness of the agencies and personnel responsible for environmental administration (Vig and Kraft, 1984, 1990 and Henning and Mangum, 1989).

His focus on the public was valid for the time, the era's media brought to the public

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<sup>11</sup> "After the Nixon administration's initial embrace of an integrated approach to environmental management, no subsequent administration has demonstrated similar interest" (Rabe 1986, p. 17).

a sharper and increasing view of the serious threats to human health and the environment (Dunlap, 1987). With environmental prospects dimming from "Reaganomics," the citizen and the environmental pressure groups and organizations blossomed during this period. It was Caldwell's view that only this type of public influence would keep the environment on the government agenda in America.

In 1987, Caldwell's Biocracy: Public Policy and the Life Sciences, integrated the theme of comprehensiveness in relation to the environment with the social sciences as a general approach to solutions. Caldwell promoting a greater social science influence, touted the public as the agenda setters for the future. Forms of civic participation within innovative policy structures now became the focus for building some form of consensus on both the substantive and moral bases of policy. In his concluding thesis, while acknowledging that the social sciences are not the panacea for developing environmental policy, he states that they are nevertheless a helpful tool that can "inform human choices and expose assumptions that lead to folly. The risk of learning from the life sciences is less than the danger of failure to learn" (p. 227).

In 1990, Caldwell was still addressing the main unresolved question of the environment in his book Between Two Worlds: Science, the Environmental Movement, and Policy Choice. The concern in the 1990s is summarized as "the possibility of attaining the ideal of a harmonious, productive, and sustainable society of man-in-biosphere" (p. xiii). He addresses this concern through humans and their ability to adapt their ways of life and "to conserve the natural systems upon which their future and the living world depend" (p. ix).

Caldwell shows a clear appreciation that CEDM, mainly used through NEPA's instruments, had not been able to realize its full potential. He has consider returning to the policy concepts which first set the pace for CEDM in the 1960s, looking for a broader

expression of the concept for the 1990s. Caldwell concludes that an amendment to the American Constitution would provide a constitutional basis for environmental policy in the United States. This would have a three-fold effect:

- by placing responsibility for environmental policy on the list of constitutional obligations it would make it more difficult for a President to ignore;
- the courts would be required to consider the merits of environmental disputes; and
- a constitutional mandate in the United States would oblige the country to honor environmental principles around the globe (1989).<sup>12</sup>

Caldwell (1989) had gone back to John Adams and Thomas Jefferson to emphasize the concept of citizenship as a moral obligation. He acknowledges that government coordinating structures have not been able to encompass the full application of environmental integration and in "NEPA Revisited: A Call for a Constitutional Amendment" calls for a return to the fundamental values underlying NEPA (p. 18). Caldwell is looking for a reopening of the debate surrounding man and environment relationships—to bring it to the public as a much needed consciousness-raising exercise. In short, he seeks a revival of the public commitment to the environment.

Caldwell developed his underlying comprehensive theory from historical passages of an ideal American government and linked it with the public's responsibility for biosphere environmental commitment. His rationale for integrated and comprehensive environmental policy is linked to integrated problem-solving supported by the administrative coordinating

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<sup>12</sup> There has been some discussion in the United States from other sources about inserting environmental protection (as a fundamental right) into the Constitution. See for example; Robert A. McLaren, in *Harvard Law Review*, 137-45 and 149-51 (1990) citing environmental provisions in 29 state constitutions. Several states have introduced an environmental fundamental right into their state constitutions, examples include Illinois, Rhode Island and Pennsylvania. See *The Harvard Environmental Law Review* (Vol 16 #1, 1992) for a discussion on Constitutional entrenchment of environmental rights.

organizations of government.

The basic priorities of CEDM must, according to Caldwell, be supported by both government, and individual responsible citizens. Government should operate at a policy level that is understandable and provide an administrative organizational style that would:

- be broad enough to encompass the problems;
- facilitate coordinating efforts;
- be flexible and provide a forum for interactive problem-solving; and
- apply sound science and technologies to problems.

Citizens are to participate, "learn-up" and become functional through their linkage to their environment. In this government/citizen structure, the environment is to be integrated in three interrelated ways:

- perception of man's relationship to his environment;
- information or knowledge to form this perception; and
- operation to act on knowledge.

Caldwell's foundation was not meant to be static; his own research evolves in time. Increased rationality and openness would be a natural progression as knowledge is gained and underlying assumptions about the environment and man's place in it become more understood.

For four decades, Caldwell has been a central scholar in the quest for the implementation of comprehensive environmental decision making in public policy to meet his overall agenda. While opportunities and responsibilities lie with all citizens, the special role of the professional to apply sound scientific principles consistent with CEDM theories was identified specifically by Caldwell in 1986. Strengthening environmental ethics and the institutionalization of arrangements that will assist ethical conduct instead of "as at present,

abetting through dereliction a behavioral pattern of improvidence and neglect" (p. 117), represents Caldwell's direction for environmental professionals.

Caldwell (1990) describes the current situation as "wandering" between the past and the future and states, "our transition is marked by confusion and paradox, for we have no road-map to guide us..." (p. xiii). In 1964 Caldwell called for a comprehensive search for factors relevant to CEDM instrumental utility. Today he makes the same plea.

This research agenda follows Caldwell's call for the professional to "learn-up" to his responsibility. This research does however, deviate from Caldwell and suggests a different path, not through a revival of a 1960s era of environmental interpretations and not through a constitutional amendment, but through a new path of understanding and paradigm change through which CEDM can be operationalized by the larger community of environmental professionals.

#### **4.1.3 The "Functional Citizen"**

Caldwell's "functional citizen" sees a world in which one is not alone but connected to the whole, which is at the heart of the CEDM idea. This citizen would have a broader view of economy and environment in relation to, for example, environmental political parties. It can be logically suggested that a "functional employee" will support both the workplace and the environment, or the economy and environmental quality.<sup>13</sup> The "functional citizen" perspective can reorient environmental professionals from apathy or, at best, a social cause environmental advocate, to a committed environmental professional sharing a vision for the future.

These committed people, as functional citizens representing the broader society are

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<sup>13</sup> See the work of such authors as Drucker, 1989; Naisbitt and Aburdene 1990; Anderson and Leal, 1991 and research from the Institute of the Future to confirm the relevance of the individual in the workplace and the importance of changing perceptions and values.

the limiting factor. Any movement requires some way to make it come alive. For Caldwell, CEDM comes alive through the "functional citizen." The environmental professional is called on in this research to act as the "functional citizen" and catalyst for the CEDM movement.

This "obligation" ethic would become the baseline for the functional citizen, the force behind follow-on action. This force does not presuppose "harmony with nature," but presents an obligatory value orientation from which the environmental professional, and eventually society, can garner the power required to address the crisis at hand.

Although professional ethics leads the study and motivates the researcher's professional agenda, which includes commitment to a CEDM paradigm, there is no suggestion that this personal form of "applied ethics" will automatically become ingrained within the environmental profession or in society at-large, and indeed as Hargrove (1989) states, "rules will have to be argued about at length, and real people in the real world will have to try them out to see if they work" (p. 9).

This research spans a decade and going into the 21st century, CEDM remains the focus of understanding and application in an industry setting.

At the business organization level, theories of the seventies are dismissed. These maintain that when a new member enters an organization, he/she is confronted with a social structure and a set of expectations for behavior. Hall (1977) maintains, for example, "that it does not matter who the particular individual is; the organization has established a system of norms and expectations to be followed regardless of who its personnel happen to be, and it continues to exist regardless of personnel turnover" (p. 26). The theory of the 1990s, however, maintains that it is the individual that will initiate and foster change and that the norms of organizations in The New Realities will simply defy the concepts laid down in the cultural and political economic culture of America (Drucker, 1989). Drucker calls them "the

new archetype of the educated person" (p. 264). Caldwell calls them the functional citizen.

Drucker's reflections on empowering individuals suggests that a paradigm shift in business from control and command hierarchial management to matrix management provides the individualan organization where ideas can be developed. The 1960's graduate who is now a senior manager and the 1990's graduate have, to some relative degree, an expression of learning and empowerment under the matrix management.

Contributing to the architecture of CEDM learning, Caldwell has established what CEDM stands for and what it seeks to create. Figure 4 shows the vision, values and purpose for the core of the paradigm consensus articulating CEDM.

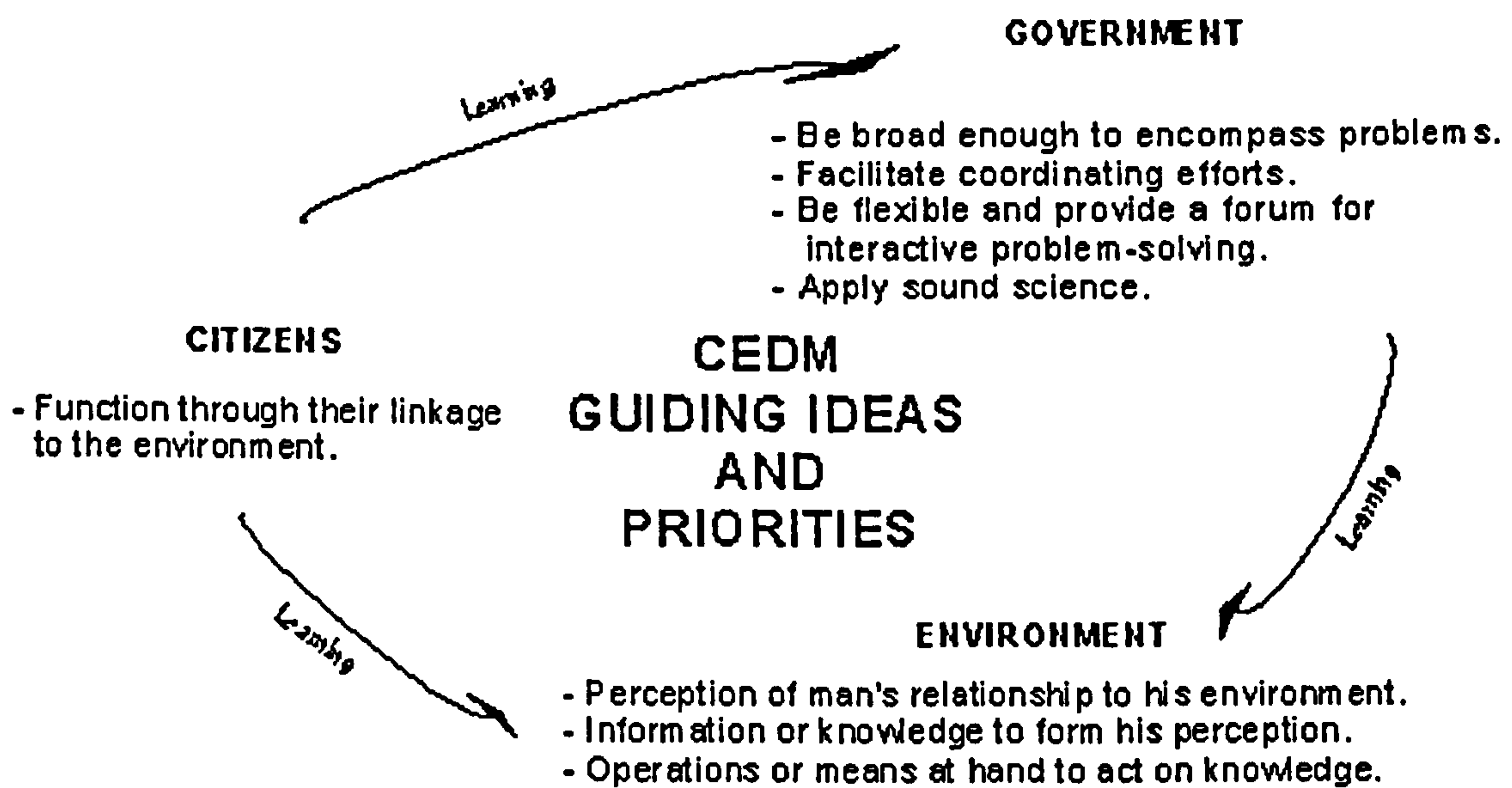


FIGURE 4 CALDWELL'S PRIORITIES FOR CEDM



## Chapter 5: ETHICS

The "ethic" of the professional, not unlike "Caldwell's citizen" is our way of doing things; it is based on our perceptions and interpretations, and is a direct result of our own environment (Hargrove, 1989). Professional ethics are closely associated with problem exploration as they reflect a professional's attitude toward improving environmental problem-solving and environmental quality. Our ethics involve why and how we participate and learn. This type of "ethic" does not stand outside the bounds of a genuine commitment to see something larger than ourselves, the "environmental" vision beyond self-interest<sup>14</sup> that has also been proposed as an overall "economic" vision and corporate leadership model for the 1990s (Senge, 1990).

Professional ethics as formulated by the theoretical and academic community, traditional environmental community, and the business community must be applied by working environmental professionals who do not inhabit an ideal world. Certainly in the corporate boardroom or on the shop floor, expounding an environmental ethic will not get you very far; rather, the environmental professional must work with established policy instruments and corporate management as well as operational and economic interests to implement ideas.<sup>15</sup>

What method or methods of ethical enlightening, strengthening and decision making (called for by Caldwell) should the professional use in environmental matters? Ethics in the

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<sup>14</sup> This interpretation of an environmental ethic does not discount the Brussels Code adopted by the European Community in Brussels, May, 1987. This research does however, suggest that an ethic can not be dictated in lists of requirements, but rather the environmental ethic must be developed by the individual incorporating their unique characteristics (See Berry, 1993 for his discussion on environmental practice codes).

<sup>15</sup> Work by Dery (1984) reinforces the "realistic" conception of analysis when attempting to solve a policy problem. Dery states that, "what is realistic is precisely what must be discovered. This is where the interpretation of problems as opportunities appears to be most helpful" (p. 10).

context of several functional aspects and conceptual principles will be used to answer this question and extend the core CEDM paradigm presented and illustrated in Chapter 4.

Ethics for the environmental professional are achieving some degree of standardization through professional associations. By 1993, the ethics for environmental consultants had become a national agenda, as accrediting groups from around the country met in Washington, D.C. to create a universal framework. Moving in this direction, the National Registry of Environmental Professionals (United States) includes in their Code of Ethical Practice: "To use best principles of environmental science, health, safety and technology in planning and management to protect and enhance environmental quality." If "best principles" are linked to operational aspects (as an example, to Total Quality Environmental Management (TQEM) operational standards, or Environmental Management Systems Standards or through CEDM implementation actions which are mutually compatible) then the code is violated if a professional chooses or is advised to do otherwise.

Building from Caldwell's CEDM, this Chapter goes on to describe two theoretical ideas which the researcher believes to be essential to an ethical expression of CEDM by the environmental professional: systems thinking and professional obligation.

## **5.1 SYSTEMS THINKING**

If one is to operationalize CEDM professional ethics, developed through thinking and learning, individuals must have an avenue for implementation in the workplace. The work of Senge (1990), following on the work of Jay Forrester, who pioneered "system dynamics," at MIT, describes the changing organization of the 1990s, and provides current insight into

how vision, values and purpose may be translated within the organizational setting.<sup>16</sup>

Systems thinking, while not the only learning discipline, is the discipline that integrates the theory and techniques of:

- Personal Mastery—the discipline of "...continually clarifying and deepening our personal vision, of focusing our energies, of developing patience, and of seeing reality objectively...Personal mastery fosters the personal motivation to continually learn how our actions affect the world."
- Mental Models—the discipline, defined as a developmental path for acquiring certain skills or competencies, is a life-long activity "...which begins with turning the mirror inward; learning to unearth our internal pictures of the world, to bring them to the surface and hold them rigorously to scrutiny...Mental models focus on the openness needed to uncover shortcomings in our present ways of seeing the world."
- Building Shared Vision—the discipline of "...principles and guiding practices for vision sharing." The discipline that teaches "...a genuine vision garners people's energies, people excel and learn, that a vision cannot be dictated...Building shared visions fosters a commitment to the long-term."
- Team Learning—the discipline that suspends assumptions and allows members of a team to enter into a genuine "thinking together...Team learning develops the skills of groups of people to look for the larger picture that lies beyond individual perspectives" (Senge, 1990, pp. 6-12).

To leap from ethical thought to an ethical approach that can be implemented in the workplace, the research has to address the basic issue of imparting the knowledge and understanding required for a group commitment inside or outside the organizational setting, the art and practice of learning (Senge, 1990). The "shift of mind," from seeing oneself as separate from the world to being connected to the world has grown out of operations research and military research and systems-oriented ideas reflecting ecological thinking which are manifested in, for example, ecosystem models. As a management model of self-organization, systems management is being taught in leading business economics and

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<sup>16</sup>The Sloan School of Management has been developing this idea since the 1970s. Corporate leadership at Apple, Ford, Polaroid, Royal Dutch/Shell, Digital, Proctor & Gamble, AT&T, Hanover Insurance and Trammell Crow practice learning organization management as an implementation tool. The Harvard Graduate School of Business stresses the importance of learning how to learn within a business environment. This learning concept can be properly applied to linking environmental and management paradigms.

management schools, exemplified by the Sloan School of Management at MIT and by Harvard Business School. "Learning" is being used to develop systems thinking. Seeing the structures that underlie complex situations in the environment, in the corporate structure and throughout society the business organization is being reexamined as a living social system.

Systems thinking within the corporate system gives people a shared responsibility for problems generated within the system. It does not necessarily mean that everyone has the same leverage in changing the system, but rather that a search for scapegoats is unproductive. Problems are not perceived as being caused by someone "out there" but from within; personal actions create the problems that the individual and the company experience. Within such an organization the people create their reality and they can change it. The bridge to environmental issues is made when it is recognized that most of the problems faced by mankind arise because of our inability to grasp and manage the increasingly complex systems of our world today (Senge, 1990).

For the Sloan School and for business leaders such as AT&T, Apple, Digital, Royal Dutch/Shell who try to master the strategy, art, and practice of learning, systems thinking is considered at the forefront of organizational survival in the 1990s and beyond. Not to use this technique is considered a learning disability fatal for the business organization.

An associated "fatality" resulting from our learning disability may be identified in the State of the World (1995). According to this progress report toward a sustainable society, the global partnership called for at the Rio de Janeiro U.N. Conference on Environment and Development "is floundering due to a failure of political will" (French, p. 171). The interests of the business community are seen to be served through integration of economic development and a burst of innovation is called for on behalf of industry and government alike. The people are presented as the best hope for the process of overall global governance.

The business and global environments can be improved upon by seven solution-oriented principles, intricately linked to the issues of ethics and systems thinking, and seen as cornerstones for the economy and for the environment. Work from MIT tells us that to achieve economic stability and growth, a learning company will enlist and promote systems thinking such that:

- people in the organization focus on the organization as a whole;
- problems are not "out there" but within the organization;
- people become proactive to see how they contribute to their problems;
- it is recognized that crisis is seldom sudden, but rather comes from a gradual buildup of various processes;
- attention is paid to the subtle as well as the dramatic;
- company structures are promoted that support learning and reject functional divisions where contact is cut-off;
- individuals take precedence over the "management team" (Senge, 1990).

This focus is also relevant to an environmental ethic, an ethic that has systems thinking at its core. This is an ethic, this research suggests, that will promote the "shift of mind" (Senge, 1990) or "way of seeing" (Kuhn, 1970) whereby the environmental professional emerges as Caldwell's "functional citizen" (Caldwell *et al*, 1976).

The environmental ethic in this sense builds the learning foundation on which larger-scale ethical theorizing can be based. This strategy provides both the environmental professional and the organization the means to see the relationships, linkages, and reasoning associated with CEDM. Without this understanding it is unlikely that CEDM can advance in the organizational setting. In the absence of CEDM, we are condemned to our current organizational view of the environment, as something outside ourselves, and basically the

domain of the environmental department within the organization.

Many professionals adopting initially the more traditional view of an environmental ethic have for years been involved in some form of systems thinking, and those same professionals have been facing the problems associated with the integration of this ethic into the business community where learning associated with systems thinking has not been practiced. Organizational learning within the broader management community is what ultimately prohibits or enlists the integration of the environment within the broader organizational functions. In the United States, this is epitomized by the "environment" being defined and understood in terms of regulatory compliance. This, among other issues, prevents the "functional citizen" from evolving within an organizational setting.

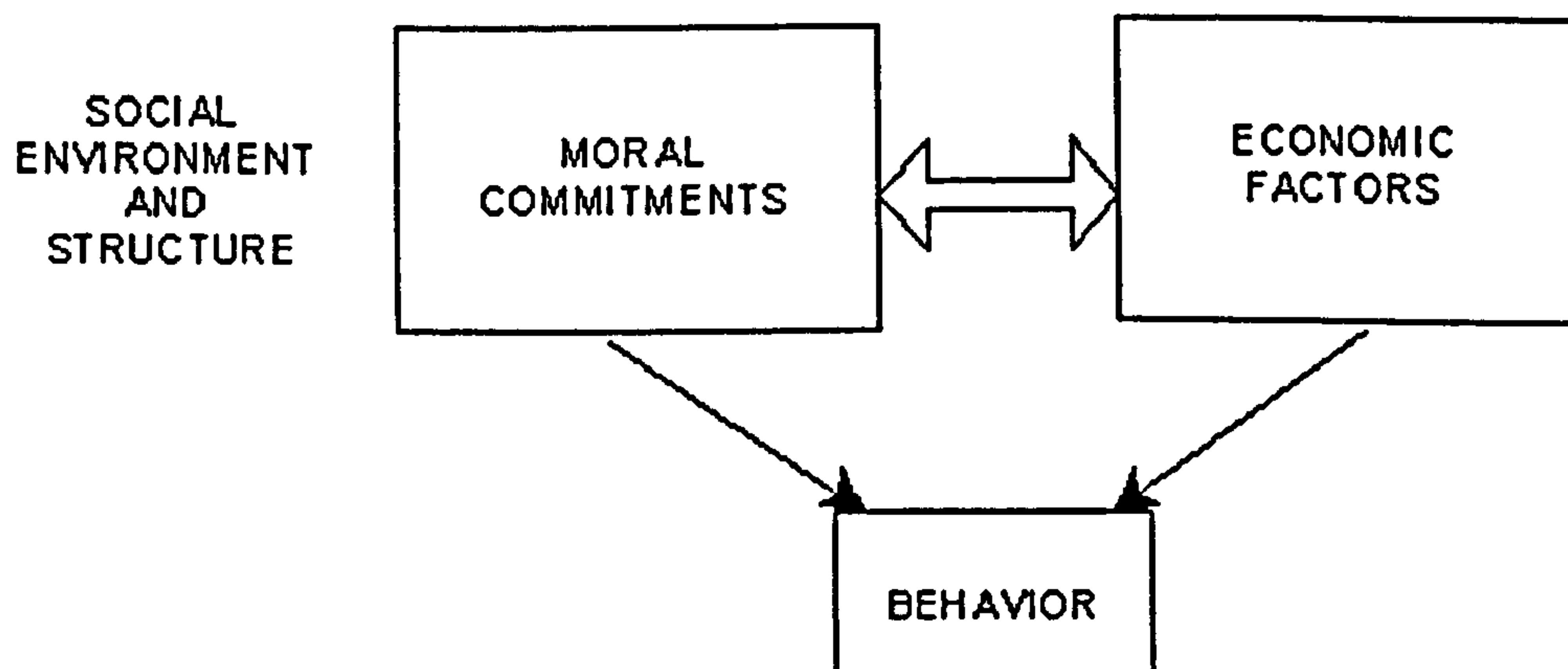
#### **5.1.1 Systems Thinking in the Organizational Setting**

The researcher's experience suggests that environmental professionals may be leaders for beginning the "shift of mind" toward the organizational learning described by Senge. Leaders who can construct this new view of an organization must above all take a stand to rebuild themselves and the organization. Historically, regulations have provided the parameters and criteria for professional activities. The immunity of regulations to innovation and flexibility have provided the professional little incentive to see the world differently. Systems thinking in its total context begins the transition to a commitment way of seeing professional responsibilities and obligations.

Within an organizational setting, "systems thinking" begins with our guiding ideas which serve as the foundation of our "vision," and the "vision" can emanate from the top or from people interacting at many levels. According to Senge (1990), "the origin of the vision is much less important than the process whereby it comes to be shared" (p. 214). The road to such an operational development, however, has been cluttered with organizational

baggage that views the environment as "the enemy" or as "something out there." Coupled with the limitations of traditional ethics, day-to-day ethical decision making has usually taken the form of piecemeal self-interest or utilitarian trade-offs.

The researcher suggests that a systems thinking foundation for CEDM can help in the rationalization of operational instruments that establish a course for economic growth and environmental quality; and that put the responsibility back on the individual. The relationship between moral commitments and economic factors is that while both affect ultimate behavior, they also affect each other. The relative weight given to each in different situations is expected to vary, the importance of both to the environmental professional's behavior is illustrated in Figure 5.



**FIGURE 5 RELATIONSHIP BETWEEN MORAL COMMITMENTS AND ECONOMIC FACTORS (Source Etzioni, Amitai (1988). The Moral Dimension, Toward a New Economics)**

The development of corporate environmental ethics has been described by Arthur D. Little, Inc. (1991) as the most important challenge facing today's directors. Moving away from the more traditional viewpoint of ethics and in turn capitalizing on the evolution of ethics based on systems thinking would allow judgements to be made on theories and principles associated with CEDM.

The arguments concerning "ethical" environmental problem solving usually revolve around the appropriateness of the principles on which we rely, the method of using the principles, and how to get judgements made that are based on principles. While CEDM does not remove all the difficulties in making an ethical environmental decision, the approach of rendering ethical judgements through a CEDM paradigm lessens the potential for negligent and reckless decisions.

## **5.2 GUIDANCE FORUMS**

There are a number of ways in which "ethics" is interpreted in professional and business organizations today. This research examines several of those that are important in American society.

Setting an example for professional organizations, an ethic has been developed for the design profession. The World Congress of International Union of Architects and the American Institute of Architects (1993) adopted a "Declaration of Interdependence for a Sustainable Future" that places environmental and social responsibility at the core of practice and professional responsibility. In addition, the Interprofessional Council on Environmental Design, a coalition of architecture, landscape architecture, and engineering organizations, developed a vision statement to pursue this new ethic as a multidisciplinary partnership.

To give potential systems thinking professionals a hand, "guidance forums" have been developed within the business/environmental community that can add to the basic learning tenets for a successful corporation in the 1990s. Guidance forums provide direction and some initial structure, but most do not integrate the complete picture. Many start out with a notion that presumes those working in the forum understand and think in systems. Most guidance forums need to be supplemented with learning about systems and how to think in a non-linear way in order to be successful.



One initiative that is particularly advanced from both the industrial and environmental perspective, is TQEM. Professional strategies committed to an environmental ethic, emphasizing both economics and environment, and allowing for systems thinking, have become integrated within this strategic management initiative. TQEM combines the concepts of environmental management with total quality<sup>17</sup> and operational guidelines. This strategy is being fostered by businesses worldwide. Its goal is to "...promote a worldwide business ethic for environmental management and sustainable development" (Global Environmental Management Initiative (GEMI) goals statement).

GEMI is promoted internationally through the International Chamber of Commerce headquartered in Paris. From the international GEMI workshop held in 1990 we know that the operational environmental "ethic" associated with this strategy is pollution prevention. There is an underlying commitment within this strategy to minimize the impact of an industry's operations on the environment through principles that provide for sustainable development.<sup>18</sup> The list of companies and agencies that have adopted these principles is growing, while administrative agencies like the EPA and non-government interests like the Conservation Foundation/World Wildlife Fund (WWF) have also become associated with it.

This ethic was described by Russell Train (1993) of WWF, speaking at a Corporate Quality Conference, as in our individual, national and global interest. At the conference, Train described four key action tools that can realize this initiative: economics, new technology, environmental literacy and environmental governance. According to GEMI, and

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<sup>17</sup> The dynamics for managing for "quality" and managing for "learning" should not differ fundamentally; the building blocks for both are systems thinking.

<sup>18</sup> Sustainable development principles associated with GEMI are outlined in The Business Charter for Sustainable Development (International Chamber of Commerce, 1990) which has as its foundation Our Common Future (World Commission on Environment and Development, 1987). The Charter was formally launched in April, 1991 at the Second World Industry Conference on Environmental Management.

supported by participants at the Quality Conference, these "action tools" all have at their foundation the commitment to pollution prevention.

While the desire for TQEM may be unquestioned in principle, implementation of the initiative and "key action tools" is hampered by a lack of systems thinking and other issues, most critically the coupling of science and risk management. Speaking at the 1993 Corporate Quality Conference, Don Ritter, chairman of the Washington, D.C. based National Environmental Policy Institute and former member of Congress said the "regulated community must pull out all the stops to ensure that sound science, risk concerns, pollution prevention and waste minimization understanding are brought into the system at every level."

The TQEM professional is someone who takes a comprehensive, realistic and systematic approach to management. This systems thinking professional may guide a corporation's learning for the environment and act as a leader to crystallize objectives and to build organizations where people continually expand their capabilities to understand dynamic complexity, clarify visions and improve shared mental models. That is the learning organization that can expand and operationalize CEDM.

A broader understanding of the environmental professional's attributes can be linked to the environmental organizational models and eco-management schemes that are becoming more focused. The leading model follows the early work of Georg Winter *et al*, (1989) and is now known throughout America and Europe as the "Winter Model." The goal is to minimize a company's environmental impact and make all its operations ecologically sound. This type of implementation is recognized as requiring a radical change in the corporate culture. The TQEM learning goal reflects the same ideas, but the eco-management model generally implies a broader interpretation of the shift of mind associated with systems thinking and ecologically sound operations. With this broader interpretation come

perceptions, ways of thinking, values and practices that are profoundly ecological and are described by the Elmwood Institute as the "deep ecological" shift, which according to the "deep ecology" paradigm is the forerunner of a systematic world view (Lenore Goldman, 1992).<sup>19</sup>

Approaches to environmental management standardization can also be seen as offering early guidance to professionals. British Standard (BS)7750, considered the first standardized plan provides the key elements in establishing an environmental management system: preparatory stage, implementation stage and the final auditing and review stage. The standard looks for linkages to BS5750 Quality Systems and is described as the means for an organization "...to comply with new environmental challenges as efficiently as possible...BS7750 embodies the concept of continual improvement, a crucial component in building a better and more profitable business" (Centre for Environment & Business in Scotland, 1994, p. 7).

Environmental challenges have been presented as those components within the environmental management system (EMS) which should:

- identify and evaluate the environmental effects arising from the organization's existing or proposed activities, products or services, to define those of significance;
- identify and evaluate the environmental effects arising from incidents, accidents and potential emergency situations;
- identify the relevant legislative and regulatory requirements;
- enable priorities to be identified and pertinent environmental objectives and targets

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<sup>19</sup> This ecological shift does not stand apart from economic issues and there is considerable evidence that corporate culture changes—which include formal and informal ethical codes—are supported if they can deliver the change desired at a much lower cost—cost being the motivating factor. Evidence supporting the claim from the environmental perspective comes from the stockpile of literature that is developing around pollution prevention and its follow on slogan—pollution prevention pays.

to be set;

- facilitate planning, control, monitoring, corrective action, auditing and review activities to ensure both that the policy is complied with and that it remains relevant; and
- be capable of evolution to suit changing circumstances (British Standard 7750, 1994, p. 11).

While such system components are important, and the research does not suggest otherwise, organizational managers and other personnel who undertake these actions must understand the systems disciplines first to guide their appreciation of these components and then to direct linkages to management actions and decision making. Visions and mental models which are truly capable of defining, developing, and committing to the environment within the broad conditions of the standard "...from within the workplace to the global system" may need to borrow learning attributes from the larger business community. These learning attributes are seen as the key to the deeper ecological mind-set that provides the fundamental change necessary to achieve the broader objective of such standards.

BS7750, is considered the forerunner to the International Organization for Standardization (ISO) Environmental Management Systems (EMS) Standard adopted (October, 1996) and now formally accepted as the American National Standard by the: American Society for Testing and Materials, America Society for Quality Control and NSF International. The EMS specifications identified as ISO 14001 models the EMS as a continual improvement process linking environmental policy, planning, implementation and operation, checking, and corrective action. Principles associated and referenced by the standard's guidance document include those of GEMI, which are seen to incorporate the evolving needs of society for environmental protection.

EMS in the United States is being interpreted in several ways in environmental management. The Registrars Accreditation Board (RAB) in association with the American National Standards Institute (ANSI) has approached an ISO 14001 EMS, in their acceptance of the standard and through an Auditor Certification Program (adopted in December, 1996), as akin to Quality Management Systems. Certification recognizes systems conformance with little or no critical recognition for environmental aspects. The remaining two approaches are most evident in the environmental professional community. One road is characterized by following the standard much like a regulatory guideline. On this road lawyers and professionals are remaining skeptical and continue to dismiss the sustainable development prospects for the standard. The other is moving EMS towards being an instrument that can instigate significant change in corporate structure, social accountability and environmental performance. In this light, the wider implications of EMS are that it can be an avenue to significant change within the organizational setting.

Aligning EMS with the latter, EMS is considered in this research as a corporate innovative infrastructure that can support CEDM. This aspect of CEDM learning is further advanced in Part C.

### **5.3 ENVIRONMENTAL ETHICS AND THE AMERICAN COURTS**

The importance of environmental ethics within this study agenda is emphasized by a court ruling. In *Bowman v. Mobil Oil Corp* (1987, Civil Action No. 87-4093) a New Jersey state jury ruled that professional codes of ethics represent an articulate mandate of public policy. In this case, V.A. Bowman was employed by Mobil Chemical Company (a division of Mobil Oil Corporation) as manager of environmental controls. He supervised several environmental professionals with regulatory responsibilities for air and water pollution control. Bowman charged that he was wrongfully dismissed from Mobil for refusing to

undertake two actions that he deemed were in direct conflict with the Code of Practice established by the National Association of Environmental Professionals (NAEP), to which Bowman belonged. Based on the facts presented in the trial, the jury was asked to answer three basic questions: Did Bowman prove that the acts requested of him would have constituted a violation of public policy? Did Bowman know that those acts would be a violation of public policy? Was his refusal to perform those acts a motivating factor in Mobil's decision to dismiss Bowman?

In all three areas, the jury decided for Bowman. Such a legal action opens the door to clarification of professional ethics and responsibilities within a business setting and provides some indication as to how ethical principles can be furthered through civil actions initiated by functional citizens.

#### **5.4 OBLIGATION**

Although professional ethics has a key role in this study, as well as underpinning the researcher's professional agenda and commitment to a CEDM paradigm, there is no suggestion that this personal form of "applied ethics" will automatically become ingrained within the environmental profession or society at large. To address this commitment question and to try to capture the energy of a committed environmental professional to a new vision for CEDM, this research suggests an environmental ethic that borrows both from Kant's "practical reason"<sup>20</sup> laid down during the Enlightenment period, and from a perspective with a modern-day foundation laid down in the legal community, which requires that a "reasonable

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<sup>20</sup> Kant's "practical reason" suggests that morals are derived from an intuitive sense of being under obligation, from a sense of duty, not from any external authority of a religious creed, not from the pressures of a material or social environment (see Hargrove, 1989 and Des Jardins 1993 among others discussion of this from the environmental ethics perspective, see Bullock, 1985 among others for a discussion from the humanist viewpoint).

approach"<sup>21</sup> be adopted by the "functional citizen."

The term "reasonable" in legal terms carries a certain objective standard of care, not to be determined in terms of what a particular individual is capable of achieving in a given set of circumstances, but rather calculated in terms of what a "reasonable person could and would achieve given the degree of risk of a certain kind of harm occurring in given circumstances" (MacCormick, 1982, p. 218). Intentional willfulness or gross carelessness causing harm are characteristic of some individuals, but are not considered reasonable. It is a common-sense notion of causation set forth by Hart and Honore in Causation in the Law and further expounded by Harari in The Place of Negligence in the Law of Torts (MacCormick, 1982).

Such a standard can be applied in the courtroom and in the environmental regulatory arena. The associated works of MacCormick also provide good grounds for application of the concept as a citizen's operational principle; "that every person has a right to be secure from harm to person or possessions caused by any lapse from a reasonable standard of care and attentiveness on the part of any other person" (p. 221). From an ethical point of view, or establishing the vision beyond self-interest, a "reasonable" standard of care can bind environmental professionals to make good from having been in some sense responsible for some harm.<sup>22</sup>

If consensus can be reached on the basic broad tenet of an "obligation;" then previous research suggests that actions will be able to capture the creative energies of individuals to

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<sup>21</sup> Inasmuch as United States law is based on English doctrine, this concept is based on the foundation provided in the works of Ross (1951).

<sup>22</sup> Not everybody in a society needs to feel the force of "obligation" for it to work; it is sufficient that the ethic become the societal norm. In these circumstances, many will conform simply because to do so requires the minimum of effort of personal thinking things through. To illustrate this, the Weimar Republic and Nazi Germany comprise many of the same citizens, but public and private norms of behavior were very different.

solve problems. As problems are discussed and general communications begun, it is only necessary to negotiate norms and broad principles.

"Obligations" can be reinforced and refined for commitment and sharing in today's political and economic climate by being associated with what, at a minimum, are the basic requirements for human life. These requirements are also held to be sustainable development objectives, and subsequently reflect economic growth and environmental quality goals. The Federal government is maturing and bringing to light a rational perspective between business and the environment. From a policy view, Cotterrell (1984) describes this maturity as a move rejecting "the old form of political legitimacy based on the ideology of fair exchange expressed in classical political economy," and instead emphasizes "...the capacity (*or obligation*) of governing elites to manage successfully the economy and sustain economic growth" (p. 179).

This government perspective reflects the social order of the 1990s which emphasizes the centrality of "scientific-technical innovation" and "sound science" for legitimacy.<sup>23</sup> It would be logical to conclude that, at least for the political agenda, there may be some "obligation" to follow through and seek to maximize and refine such a course for the 1990s. This is what government should do, but what government can do may be tempered with the reality that government is no longer the only power center, and aligning government with business in the 1990s is a priority.

Irrespective of the judgments that can be made on this arrangement, business interests in the United States and the individual ethic are seen as the governing factors in the future.<sup>24</sup>

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<sup>23</sup> UK Guidance on radioactive waste disposal (1995) uses the term "good sense and engineering" to indicate a standard that has to be achieved, irrespective of the position relative to quantitative targets.

<sup>24</sup> See Drucker, 1989; Naisbitt and Aburdene, 1990 and other organizational writers regarding the new political, business, and individual relationships for the future.



By all accounts, how humans ultimately address their "obligation" will determine the future. At the very least, it is reasonable to suggest that a sense of "obligation" leading to an understanding and need to preserve basic requirements for human life and a sense for how economic growth and environmental quality may be achieved appears to be a rational beginning picture. This "obligation" ethic is critical to maintain the notion of economic growth not as undifferentiated, but differentiated and qualified whereby environmental quality is an integral part of the country's development picture. Expressed radically, we can look forward to an ethic where an improvement in environmental quality is perceived as an economic gain.

Figure 6 illustrates the ethical principles as they contribute to CEDM learning.

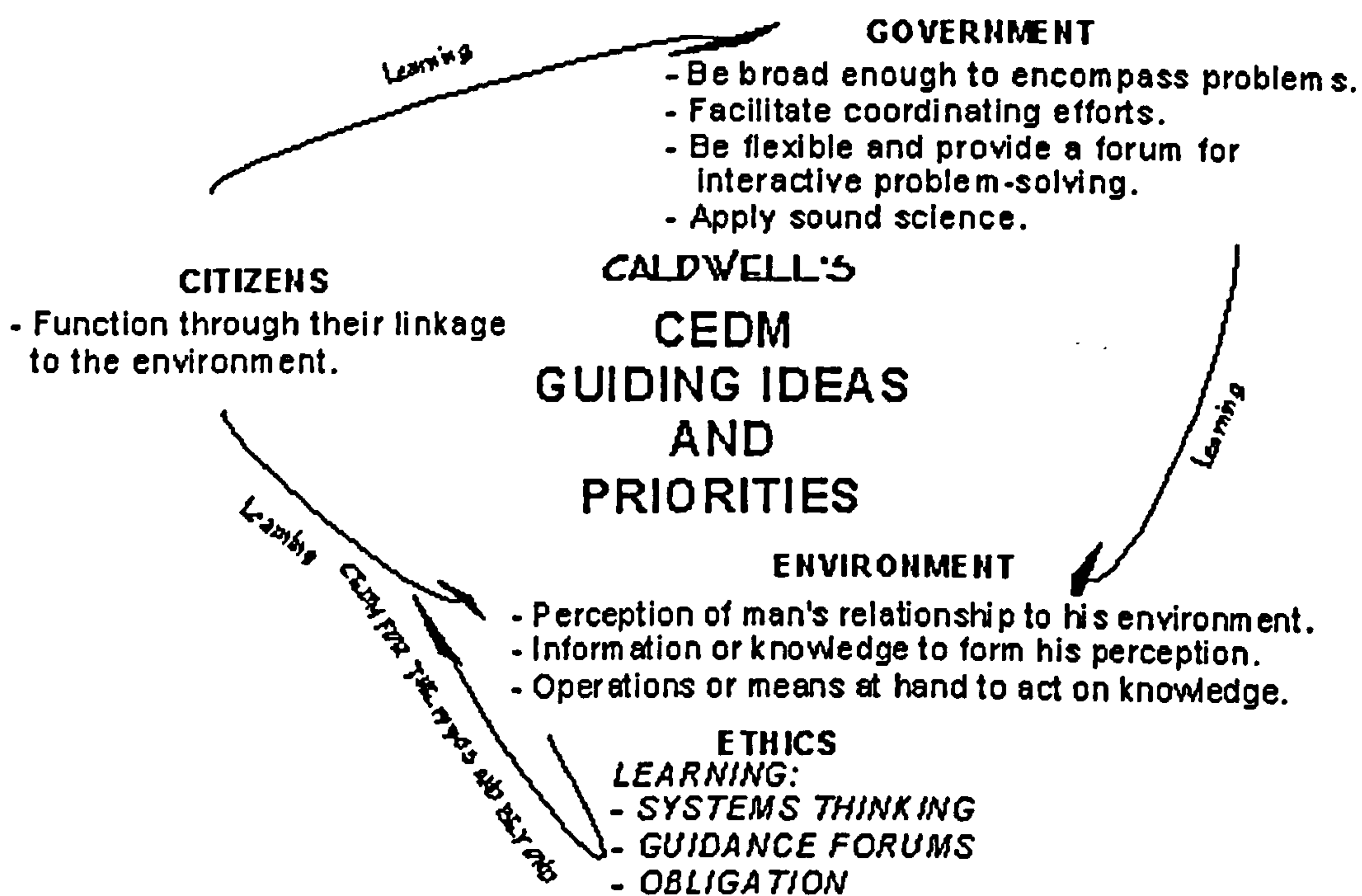


FIGURE 6 ETHICAL THEORY CONTRIBUTION TO CEDM LEARNING

## Chapter 6: GOVERNMENT

This Chapter analyzes two major environmental policy acts in the United States: the National Environmental Policy Act (NEPA), the first expression of CEDM; and the Pollution Prevention Act (PPA), which the researcher believes to be the most recent policy initiative contributing to CEDM. As contributions to CEDM learning, government problem solving, facilitation provision of public forums, and the use of sound science called for by Caldwell, these acts are examined both in relation to policy intent and as means of implementation. The CEDM strategy envisioned in this research sees government as a critical form of leverage for the common good, mandating some common goal and focal point for actions.

Policy is defined as a course of action taken or professed by governments, groups or individuals. Policy states an intent to achieve certain goals and objectives through a conscious choice of means and usually within a specified time period (Vig and Kraft, 1990). The factors relevant to policy include both actors and institutions as illustrated in Figure 7.

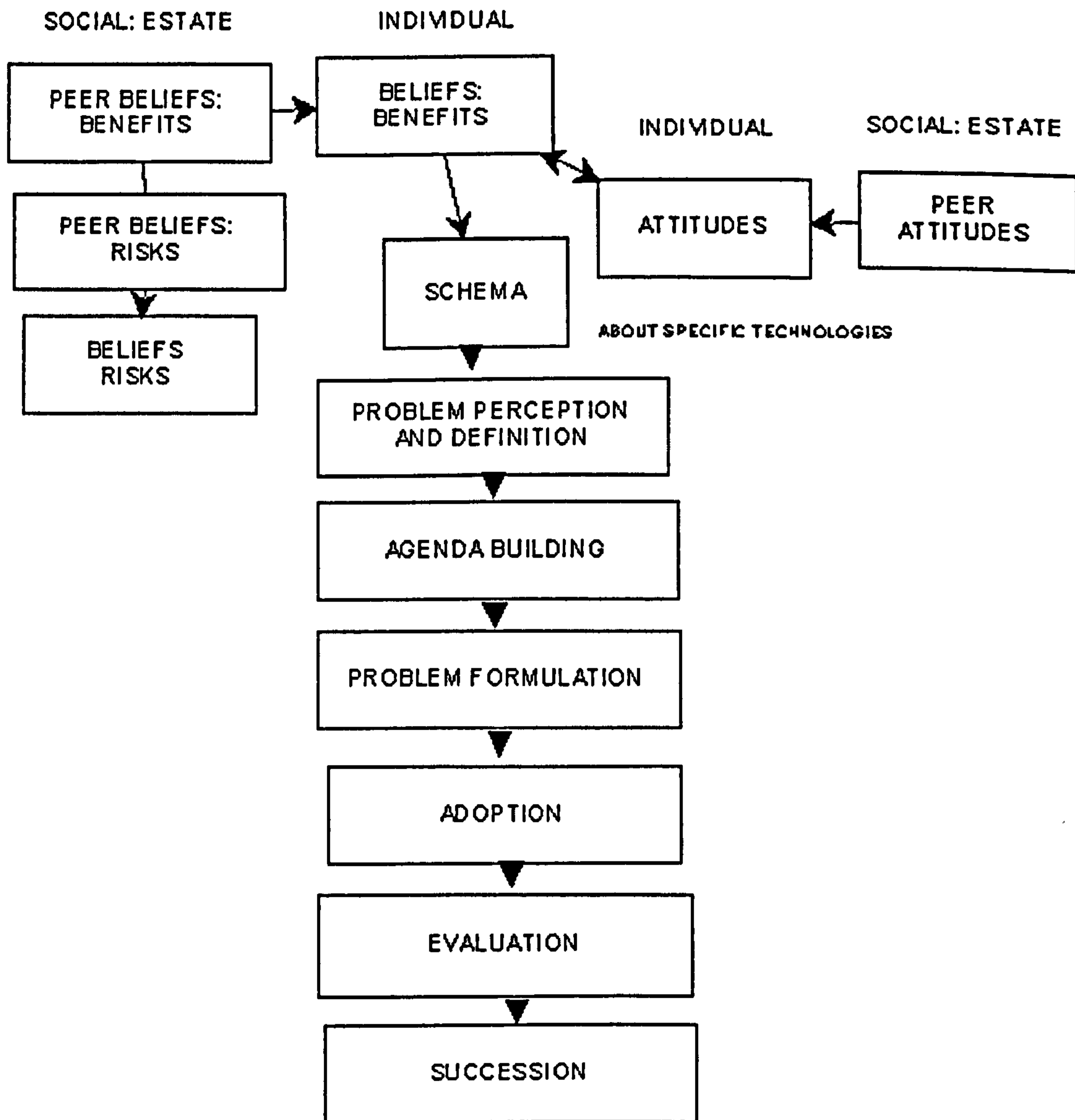
### 6.1 THE NATIONAL ENVIRONMENTAL POLICY ACT

The National Environmental Policy Act (NEPA) was the first major environmental statute passed in the United States as the result of the environmental movement of the late 1960s. The public, spurred by media coverage of the Union Oil Company's disastrous oil spill off Santa Barbara in 1969, the decline in wildlife species, and the dramatically increasing air and water pollution problems, led Congressional committees to begin examining possible legislative responses to concerns of citizens about the environment.<sup>25</sup> The environmental tenets of the late 1960s were characterized by the "rhetoric of crisis and the pervading sense that unless Congress (and subsequently the Environmental Protection Agency) acted

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<sup>25</sup> Up to the sixties, most people in the country rarely considered the environment as something deserving special attention and protection (Caldwell, 1989).

immediately, something irreplaceable and indispensable would be lost forever" (Ruckelshaus 1985, p. 21).



**FIGURE 7. POLICY ACTORS AND INSTITUTIONS**  
 Source: Lester, James P. (1989). *Environmental Politics and Policy, Theories and Evidence.*

Research by Marcus (1984) notes that legislative action in this period was influenced by: the prevailing public philosophy; various crises; symbolic politics; and various pressures from congressmen. The curbing of business power through strict government controls was a common theme.

While NEPA responded to a popular desire for Federal action to stop the accelerating

national environmental degradation, surprisingly there were no particular lobbying groups proposing draft legislation in Washington, D.C. The environmental movement in the United States was seen as a fringe group and not a viable element of political concern. The "environment" was generally considered unmanageable as a policy focus, as were the people actively involved in the movement. Speaking about that time, Senator Joe Lieberman (Connecticut) describes the sixties environmental movement as a "pretty colorful mix of students, hippies" (1990, p. 1). Hippies embraced environmental sympathies through lobbying actions and by opting out of society, both representing a desire for change. Many in Washington believed the concept to be a utopian offshoot of the Teddy Roosevelt conservation movement and first reserved environmental action for such things as the roadside beautification projects of the Lyndon Johnson administration.

By the early 1960s, the "fringe" atmosphere slowly changed, and by late 1965 the Conservation Foundation had sponsored a conference focusing on the larger aspects of the environment, called "The Future Environments of North America." It was not until early 1967, however, that initiatives began in Washington to enact environmental legislation, which was then viewed as applying to almost everything. According to Caldwell (1989) these early initiatives ranged from a joint resolution of Congress, to a statute, to a Constitutional Amendment. In the end, the resolution was regarded as ineffectual and the issue of a Constitutional provision was too novel. The middle option of a statute was selected, and NEPA was born.

Beyond deciding the form of environmental legislation, Congress was also faced with the question of what to regulate. Congressional focus finally pinpointed the need to regulate the regulators, the agencies in charge of the vast amounts of Federal lands and facilities and their huge amounts of public dollars. Agencies of the Federal government, under the direct

fiscal and political control of Congress, became the target. The Act was seen as a reform to counter the often arbitrary and environmentally indifferent actions of such Federal agencies as the Army Corps of Engineers, Department of the Interior, Department of Agriculture, Federal Highway Administration, and the Department of Defense.<sup>26</sup> Focusing on the government was seen as a prelude to a nationwide reversal of environmental degradation. It was thought that if NEPA could be enacted at the agency level then a chain reaction would affect grants, contracts, permits, loans, and licenses and ultimately bring a large part of the private sector under the conditions of the Act. The Congressional sponsors of NEPA believed this approach would supplement "existing, but narrow and fractionated, congressional declarations..." and would provide a "more orderly, rational, and constructive Federal response to environmental decision making" (Senate Report No. 91-296, 1969, p. 9).

Congressional leaders recognized that such agencies often made natural resource development decisions only on the basis of technical and economic information and that environmental implications were either not considered or, at most, accorded little recognition. Guided by Caldwell, the sponsors strove to overcome this by designing NEPA to provide the Federal agencies with the mandate and responsibility to consider the "major and environmentally significant" consequences of their proposed actions. The actions covered under NEPA include:

- agency recommendations on their own proposals for legislation;
- agency reports on legislation initiated elsewhere but concerning subject matter for which the agency has primary responsibility;

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<sup>26</sup> Today public lands administered by Federal agencies in the public domain include 661 million acres, and lands acquired constitute an additional 63 million acres. The Bureau of Land Management and the Forest Service are the Federal agencies which control most of the land (Department of Commerce, 1993).

- projects and continuing activities which may be:
  - undertaken directly by an agency;
  - supported in whole or in part through Federal contracts, grants, subsidies, loans or other forms of funding assistance;
  - part of a Federal lease, permit, license or other entitlement for use;
- decisions of policy, regulation and procedure-making, include the following actions which are considered major and/or environmentally significant:
  - actions whose impact is significant and highly controversial on environmental grounds;
  - actions which are precedents for much larger actions which may have considerable environmental impact;
  - actions which are decisions in principle about major courses of action;
  - actions which are major because of the involvement of several federal agencies, even through a particular agency's individual action is not major;
  - actions whose impact includes environmentally beneficial and environmentally detrimental effects (CEQ, 1981).

The sponsors also recognized that the decision process is often incremental, that is choices are made from a limited number of alternatives which differ only slightly from past decisions. Senator Henry M. Jackson, in his report to the Senate, described the design of NEPA as breaking "the shackles of incremental policy making in the management of the environment" (Congressional Record, 1969, p. 29069). NEPA was designed by its sponsors to create a decision making model which encourages consideration of a wide range of alternatives and their long-range environmental consequences, a CEDM priority function. Caldwell had already proposed government "how to" information and action guidelines for

such a model, and his conclusions were defined through policy initiatives in "A National Policy for the Government," described as the cornerstone for NEPA (Caldwell, 1989).

Senate Bill S1075, or NEPA, was enacted in the United States in 1969 and presented an unprecedented innovation in policy. It was signed by President Richard M. Nixon before a nationwide television audience on January 1, 1970. On signing the bill, the President remarked that it was particularly fitting as his first official act of the new decade not only because it gave disparate federal environmental efforts organization and direction, but because

the 1970s absolutely must be the years when America pays its debt to the past by reclaiming the purity of its air, its waters and our living environment. It is literally now or never.

No previous statute in the country had dealt in such a sweeping way with interactions between American society and the environment. No previous statute had transcended government departmental lines to modify or redirect so fundamentally the priorities and criteria of agency decision making. No previous statute had as its principal author, Caldwell, whose CEDM idea was transformed into a national policy objective. Today, NEPA still maintains its innovative standing and is described by the Council on Environmental Quality as the "nation's environmental Magna Carta" (CEQ, 1993, p. 151).

The legislative approval and unique character of the bill, as explained by Caldwell in a retrospective article on NEPA in 1989, was due to energetic congressional sponsorship and informed staff work. Headed by a Special Counsel, William J. Van Ness, a team of outside experts was added to the regular Senate Interior Committee Research Staff. Throughout the development of the legislation, Senators Henry Jackson and Edward Muskie collaborated with other committees and a special arrangement was made through Russell Train, the then-president of the Conservation Foundation, for Caldwell to serve as a special consultant.

### 6.1.1 CEDM's Origin in NEPA

Caldwell's committee report, "A National Policy for the Environment," after review by Senator Jackson and William Van Ness, became the authoritative statement of the rationale and underlying purpose of NEPA. The intent of Caldwell was to finally move CEDM concepts from the fringes of scholarly inquiry and theory into an operating paradigm for American public policy. The two come together in Section Two of the law as it states the purpose of NEPA:

To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality.

This clause presents a statement of CEDM purpose, a purpose which reflects CEDM values as viewed and shaped by Caldwell. The complete realization of these values in practice and their understanding is still unfolding. In a legal decision, Judge Henry J. Friendly observed that the goals are "so broad, yet so opaque that it will take longer than usual to comprehend its impact" (*City of New York v United States*, June 1972 #71-C-1639).<sup>27</sup> This judicial insight on "broad and opaque" reflects the central operational problems associated with man and environment relationships. The underlying issues originating in Caldwell's founding concept, some thirty years into the debate, remain on the fringes of understanding. Certainly, more is implied (as Caldwell, 1989 notes) in the National Policy and its supporting

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<sup>27</sup> Vague goals are not uncommon to the U.S. bureaucracy. The words associated with various government agency's operational statements of intent include "well-being," "potential," "security," "viable," "decent," "suitable," "welfare," "orderly," and "development." There is little agreement on the meaning of such concepts. James Wilson (1989) in *Bureaucracy: What Government Agencies Do And Why They Do It* provides a good discussion on this issue.



regulations than has been understood and realized—or perhaps just not rationalized to date.<sup>28</sup>

According to Caldwell (1989), the full impact of NEPA objectives has not been realized in the United States either through policy reforms or implementation structures. NEPA has survived in the United States without focused and strategic support from Congress, the executive branch, or outside lobbying interests. The lofty goals and objectives of the Act have not aroused the passionate support which Caldwell would have liked, or for that matter, criticism from environmental or special interest lobbying groups. Still, it has enjoyed a degree of success, and it is through the actions that have been attempted that operational insights can be found.

NEPA established two Titles—Title I, The Declaration of National Environmental Policy, and Title II, the Council on Environmental Quality (CEQ)—that have substantive implementation profiles and systems that have been operationalized. To understand NEPA's policy objectives and action-forcing procedures as stated and operationalized in and through these Titles, the roles and actions of agencies, courts, CEQ, government, business, citizens and private interest groups (which might be expected to play vigorous and aggressive roles) must be explored. This is the network and the associated political background that can give the environmental professional operational insight and opportunities. The organizational backbone and possible interactions of NEPA are presented in Figure 8.

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<sup>28</sup> There has never been a thorough and objective published account of the evolution of this extraordinary Act and the corresponding operational aspects of implementation. While this study approaches the need and builds on the work of others, it should only be considered a stepping stone toward a better understanding of how CEDM can and has been operationalized. Hogwood and Peters (1983) have identified the lack of research on such innovative type policies and programs, "as one of the weakest areas of the social sciences" (p. 229). Their research notes that policy dynamics research is inhibited, when little is known about the initiator policy.

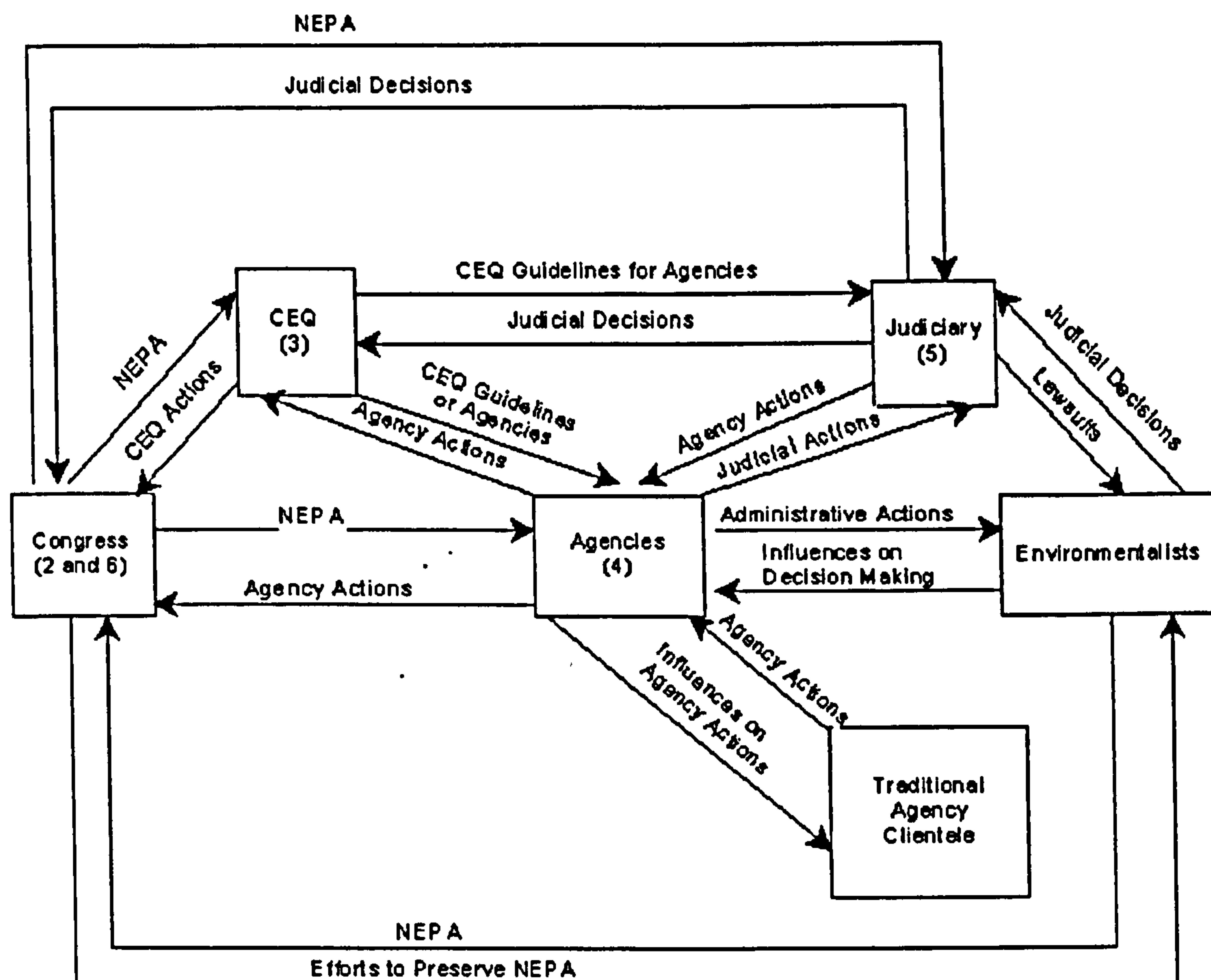


FIGURE 8 RELATIONSHIP AMONG KEY ACTORS IN IMPLEMENTATION OF NEPA. Source: Liroff, Richard (1976). *A National Policy for the Environment*.

### 6.1.2 Policy Objectives in Action

The NEPA policy intent and objectives apply to society at large, but NEPA's procedural content was focused on the need to watch the watchdog. The Federal government was told to coordinate its own functions, programs and resources to avoid adverse impact on the environment.

The Environmental Impact Statement (EIS) has become the feature of NEPA that has given it substance and notoriety. Many people feel that this process characterizes the Act as a whole. But as Caldwell noted in 1989, the EIS alone cannot compel adherence to the principles of NEPA. The EIS is, however, the central action forcing provision of the Act and it is through this provision the Act has moved into the limelight—whereby the Environmental Impact Assessment (EIA) is commonly described as the "NEPA Process."

The sponsors of NEPA wanted the statute to be more than a mere declaration of vague environmental goals and tenets of reform that could be ignored. They wanted to assure that the policy declarations would be capable of being applied in action, even though the congressional understanding of the CEDM concept was itself vague. To counter this problem, the Senate included nine (as amended) "action-forcing" provisions in Section 102 to spell out how Federal agencies would incorporate the mandates of the environmental policy into their decision making. Of the nine provisions, the most important, controversial and far-reaching has proven to be the EIS requirement contained in Section 102 (C). This Section directs all Federal agencies to:

...include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human and environment, a detailed statement by the responsible official on:

- (I) the environmental impact of the proposed action;
- (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented;
- (iii) alternatives to the proposed action;
- (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity;
- (v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Before making any detailed statement, the responsible Federal official shall consult with and obtain the comments of any Federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved. Copies of such statements and the comments and views of the appropriate agencies, which are authorized to develop and enforce environmental standards, shall be made available to the President, the Council on Environmental Quality, and to the public.(as provided by NEPA).and shall accompany the proposal through the existing agency review process.

How this provision in the policy has been implemented is reflected in the characteristics of Section 102(2)(a) and 102(2)(h) of the EIS process, and operationalized through Section 102(2)(c) in the preparation of an EIS—the familiar feature of NEPA. As

a special consultant to the Senate Committee, this process and operational mechanism was initially devised by Caldwell and described as a "method for bringing scientific information and method into the process of public planning and decision making" and not, as Caldwell (1989) candidly puts it, an "environmentalist conspiracy to frustrate growth and throttle progress" (p. 20).

Caldwell saw in the required preparation of the EIS a guarantee that Federal planners and decision makers would consider the substantive provisions of NEPA.<sup>29</sup> Generally, any type of Federal activity suggests that an early involvement in NEPA is required. This process provided the implementation procedure to address Section 101(a) of NEPA which mandated that agencies make integrated use of the natural and social sciences in their decision-making and required the use of ecological information in the planning and development of resource-oriented projects. With the exception of the policy objective associated with restoration, the process has the operational prospect of addressing all other policy objectives.<sup>30</sup> At the time, the EIS was envisioned as the essential means to an important policy end, better planning and decision making for the public than might have otherwise been the case. The EIS requirements were to be "no more burdensome than what should be expected in careful, comprehensive project planning" (Caldwell, 1989, p. 20).

The EIS provision has since been described in a memorandum document from the Executive Office of the President as the "heart of a Federal administrative process designed

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<sup>29</sup> NEPA regulations 1501.2 (d) also require an EIS where actions are planned by private applicants or non-Federal entities which are at some stage subject to Federal approval of permits, loans, loan guarantees, insurance or other actions

<sup>30</sup> Serge Taylor's study of NEPA (1984) confirms this intent, in that NEPA was intended to institutionalize scientific analysis committed to ecological values within Federal agencies. Agencies were compelled by NEPA to consider ecological values as well as economic and political factors in calculating the acceptable trade-offs in policy choices.

to ensure achievement of national environmental goals" (CEQ, 1981, Introduction page). The "heart" designed to meet the over-arching goals of the national policy has not progressed smoothly. The Cortner study on NEPA (1975) described an initial agency reaction of reluctance and incomplete policy performance. Five years after NEPA, the activities of the agencies were described as having "less than adequate, implementation (*which*) was neither systematic nor uniform, the EIS was not an integral component of the decision making process" (pp. 2-5).

In the past decade, the quality of EIS compliance has improved as agencies have come to realize the potential costs of ignoring the requirements (Caldwell, 1989). Repeatedly, courts have upheld the procedural aspects of the Act. The overall judicial opinion on the use and quality of the EIS as a provision of NEPA is described in one of the leading cases on the Act. Reaffirming the nature of Federal agencies' NEPA responsibilities, the decision in the Calvert Cliff's Coordinating Committee Inc. v United States Atomic Energy Commission (AEC) (449 f. 2d 1109 (1971) 404 U.S. 942 (1972)) stated that "In imposing an explicit duty on federal officials, the Act provides that it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to avoid environmental degradation, preserve historic, cultural, and natural resources, and promote the widest range of beneficial uses of the environment without...undesirable and unintended consequences." The EIS requirement of NEPA is a clear example of what May and Wildavsky (1978) point out, that past policies become an important (and sometimes the most important) part of the environment to which future policies must adapt.

### **6.1.3 The "Trickle Down" Effect of NEPA**

The EIS process requirement at the Federal level has also brought a major change in

the way local government deals with environmental issues. Rabe's research (1986) on state innovations relating to integrated environmental management shows that the process has been adopted wholly or partially in 28 states, indicating that the Congressional intent of a "trickle-down" effect was valid. This decentralization of NEPA concepts is robustly exhibited by state environmental quality acts. Although no systematic formal evaluations have compared the various state programs, Orloff of Cornell University Law School, has observed that all these programs differed in significant respects from both NEPA and from each other (Orloff, 1982). The trend at the state level is to include the use of impact assessments on state actions analogous to the statements required from Federal agencies. However, they may require a greater scope and depth.

Prior to the 1970s, the states were described by Wright (1982) as little more than "middlemen" in the administration of federal policies. Since then, however, states have become more active in administration of environmental protection, and many have taken the initiative in policy functions previously reserved by the federal government. The most effective state initiatives toward integrated management can be found in New York, California and Washington. Where these states have been progressive, their programs constitute a more promising vehicle for comprehensive management than NEPA (Rabe, 1986).

The California Environmental Quality Act (CEQA)<sup>31</sup> has been chosen to further illustrate the decentralization of federal policy and the far-reaching "action-forcing" and substantive requirements that can be found at the state level. California's progressive position has allowed it to move ahead and act independently of the federal mandates. When looking for navigational aids one should go to the source offering the best selection and one that is

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<sup>31</sup> Work by Lester (1990) has substantiated California's claim to be a progressive environmental state.

seen as leading environmental initiatives in the United States is California's Environmental Impact Report (EIR) policy process, which extends impact analysis to levels of integration well beyond NEPA process requirements.

With states such as California, the major issue in environmental policy direction is the extent to which private and public sectors can reach a consensus on the "rather drastic" environmental policies that such states have an inclination to pursue (Lester, 1990, p. 73). California, as a case example, is useful because policy objectives have a "best" chance for implementation. This chance is presumably correlated with the public and private sector interaction at the local level.<sup>32</sup>

California has aggressively pursued environmental protection with resources committed, legislation enacted, and institutions formed (Davis and Lester, 1989). For the purposes of CEDM operational initiatives, California provides a good follow-on example of decentralization of the impact assessment process. The legislative intent of the CEQA declares:

- The maintenance of a quality environment for the people of this State now and in the future is a matter of statewide concern;
- It is necessary to provide a high-quality environment that at all times is healthful and pleasing to the senses and intellect of man;
- There is a need to understand the relationship between the maintenance of high quality ecological systems and the general welfare of the people of the State, including their enjoyment of the natural resources of the State;
- The capacity of the environment is limited, and it is the intent of the Legislature that the government of the State take immediate steps to identify the critical thresholds for the health and safety of the people of the State and take all coordinated actions necessary to prevent such thresholds being reached;
- Every preservation and enhancement of the environment;
- The interrelationship of policies and practices in the management of

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<sup>32</sup> Researchers have determined that states with minimum financial dependency upon the federal government are best placed to promote initiatives. California ranks lowest of the fifty states in its dependency on the federal government. Institutional capacity and state commitment to environmental protection is another indicator for the enactment of environmental protection policies—California ranks second in the United States only behind Minnesota in the ranking indicators.

natural resources and waste disposal requires systematic and concerted efforts by public and private interests to enhance environmental quality and to control environmental pollution;

- It is the intent of the Legislature that all agencies of the State government which regulate activities of private individuals, corporations, and public agencies which are found to affect the quality of the environment, shall regulate such activities so that major consideration is given to preventing environmental damage, while providing a decent home and satisfying living environment for every Californian (CEQA, Section 21000).

The objectives do not end there. Additional policies are declared by the State

Legislature that enhance interactive environmental aspects. It is the policy of the State to:

- Develop and maintain a high-quality environment now and in the future, and take all action necessary to protect, rehabilitate, and enhance the environmental quality of the State;
- Take all action necessary to provide the people of this State with clean air and water, enjoyment of aesthetic, natural, scenic, and historic environmental qualities, and freedom from excessive noise;
- Prevent the elimination of fish or wildlife species due to man's activities, ensure that fish and wildlife populations do not drop below self-perpetuating levels, and preserve for future generations representations of all plant and animal communities and examples of the major periods of California history;
- Ensure that the long-term protection of the environment, consistent with the provision of a decent home and suitable living environment for every Californian, shall be the guiding criteria in public decisions;
- Create and maintain conditions under which man and nature can exist in productive harmony to fulfill the social and economic requirements of present and future generations;
- Require governmental agencies at all levels to develop standards and procedures to protect environmental quality;
- Require governmental agencies at all levels to consider qualitative factors as well as economic and technical factors and long-term benefits and costs, in addition to short-term benefits and costs and to consider alternatives to proposed actions affecting the environment (CEQA, Section 21001).

Looking beyond the policy objectives—which align in all respects and expand on many issues found in the National Policy For The Environment written by Caldwell—the California Legislature requires that all public agencies, boards and commissions adopt by ordinance, resolution, rule or regulation, objectives, criteria, and procedures for the evaluation of projects and the preparation of environmental impact reports (EIR) and



negative declarations (CEQA, Section 21082). The requirement also applies to local agencies for any project which they carry out or are required to approve. The EIR requirement in the State applies to private projects, which require State agency approval, participation or financing as well as government projects and legislation (CEQA Section 15002 (c) and in 15378).

A "project" in the State goes far beyond the NEPA interpretation at the federal level and is described as "...the whole of an action, which has a potential for resulting in a physical change in the environment, directly or ultimately." Actions may include public works construction and related activities, clearing or grading of land, improvements to existing structures, enactment and amendment of zoning ordinances, and the adoption and amendment of local General Plans or elements (CEQA, Section 15378).

The duty to minimize environmental damage is clearly established in Section 15021 of CEQA. A public agency in California has the obligation to balance a variety of public objectives, including economic, environmental and social factors, particularly the goal of providing a decent home and satisfying living environment for every Californian.<sup>33</sup> "Significant effect on the environment" (CEQA, Section 15382) is the state equivalent to NEPA's "adverse impact to the environment" and again through regulatory interpretation and in court litigation has been used to broaden the interpretation of CEQA.

CEQA has also made way for the follow-up impact monitoring of decisions to evaluate the validity of the decision and the process as a whole. According to many CEQA

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<sup>33</sup> A reader must be wondering about the devastating environmental problems that plague the State. At this point it should be noted that California has suffered from exponential population growth that has overtaxed its resources. In 1992, campaigns discussed "no growth," an even more politically charged debate than that relating to growth and/or environment. CEQA affects growth through all development projects in the State and many cities have opted for no undifferentiated growth scenarios. Davis, California is representative of this planning philosophy.

practitioners, such monitoring for long-term effectiveness will significantly strengthen CEQA's effectiveness.

Those professionals, including the researcher, who have been involved in the EIR process in California stress the intricacy of the process and the comprehensiveness of its requirements. The environmental impact process, as declared in policy, provides a CEDM operational framework that can be characterized as a "second generation CEDM process" albeit acknowledged as imperfect. The broader "good" public administration concepts as envisioned by Caldwell are being extended.

#### 6.1.4 The Public

At the federal level, the EIS provision and the freedom of information provision in NEPA Section 102 contain the public interaction requirements.<sup>34</sup> The freedom of information provision is to "make available to States, counties, municipalities, institutions, and individuals, advice and information useful in restoring, maintaining, and enhancing the quality of the environment." This requirement for full disclosure and the associated threat of confrontation by informed citizens and their expert witnesses in public hearings and in the courts brought the bureaucracy to the public. While this early NEPA provision was considered a "giant step forward" in enabling the citizens to exact responsiveness from the government on environmental issues, it has not met all the requisites for responsible government (Caldwell, *et al* 1976).

NEPA requires that each draft statement must be made public by the responsible

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<sup>34</sup> A series of federal laws, beginning with the Administrative Procedures Act of 1946, The Freedom of Information Act, 1966, NEPA, and the Superfund Amendments and Reauthorization Act of 1986, recognized the public's right to be informed. Other specific legislation such as the Clean Air Act and Toxic Substances Control Act require involvement of public groups through public notice, hearings, the creation of advisory groups, the holdings of workshops, and in some cases the direct funding of interest groups that are incapable of sustaining the prolonged activity that attention to environmental matters require. Public involvement is associated with permitting through the Resource Conservation and Recovery Act.

agency at the time it is circulated for comment, a date not less than 90 days before the proposed action. The comments must also be made available, and the final document must contain a discussion of the objections and issues raised in comments on the draft. The final draft must be made public 30 days prior to the proposed action (CEQ, 1981). While this procedure satisfied the early regulatory requirements of the Act, the public was not satisfied with this delayed level of interaction. In response, the Council for Environmental Quality (CEQ) introduced early public involvement through "scoping." Scoping provides for an early and open process for determining the scope of issues to be addressed and was given formal recognition as an integral component of the impact assessment process (NEPA Section 1501.7). The process is open to the public, state and local governments, as well as to all affected federal agencies. This requirement has been action forcing in the development of coordinating structures for integrated problem-solving supported by public involvement.

Scoping helps to insure that the real problems are identified early and thus properly studied, that issues of no concern do not consume time and effort, that the draft statement when first made public is balanced and thorough, and that the delays occasioned by re-doing an inadequate draft are minimized. Scoping cannot be seen as simply another "public relations" requirement. It has specific and fairly limited objectives. Scoping lays the firm foundation for the EIA process, providing the working framework for the government and public coordination effort. According to a document from the Executive Office of the President, April 30, 1981, on the subject of scoping "...many members of the public as well as agency staff engaged in the NEPA process believe that the open scoping requirements is one of the most far-reaching changes engendered by the NEPA regulations" (CEQ, 1981a, p.1).

Scoping is viewed as an opportunity for the public to enter at the earliest phase of the

decision making process on proposals that affect them. Through this process they have access to public officials before decisions are made, fully armed with their right to explain objections and concerns (CEQ, 1981a).<sup>35</sup>

At the state level, the basic purpose of the CEQA process is to inform government decision makers and the public about potential and significant environmental effects of proposed activities. Beyond information, disclosure to the public provides the reasons why a governmental agency acted in a particular manner (CEQA, Section 15002). California provides for early public notice of any project irrespective of whether a complete EIR is required. The public must also be notified if the agency finds that there is no adverse impact whereby a negative declaration is made (CEQA, Section 21092).

Beyond projects, whenever any person applies to any public agency for a "lease, permit, license, certificate, or their entitlement for use, the public agency may require that person to submit data and information which is necessary to enable the public agency to determine whether the proposed project may have a significant effect on the environment to prepare an environmental impact report" (CEQA, Section 21160). Public involvement is codified throughout CEQA (Sections 15073, 15086, 15087, and 15088) and in general, California has become a leader in citizen participation not least because of the activist culture of the state.

But while Caldwell and others see interactive public decision making as a foundation for CEDM, it has not come easily, nor is it perfected. In a country that coined the term "environmental gridlock," comprehensive decision making is said to have paralyzed

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<sup>35</sup> NEPA is not the only United States environmental regulation that is associated with public participation or the public right to sue. Since the 1970s public involvement programs have been a means of mobilizing support for environmental regulation and countering the administrative influence of regulated interests (Studies by among others Sabatier, 1975; Sabatier and Klosterman 1981 and Sabatier and Mazmanian 1983; and Caldwell *et al*, 1976 describe this type of public involvement in regulation).

environmental policy in the Congress and mired the courts (New York Times, 1984). "Environmental gridlock" is described by Covello *et al* (1987) as one of America's most pressing environmental issues at the national, regional and local level. Non-adversarial mechanisms are seen in the 1990s as an important policy choice since concerned citizens will have to improve their ability to translate their beliefs into effective political influence. The public will have to struggle to define their own interests and preferences for the future in a world filled with policy dilemmas and tough choices.

### 6.1.5 Council on Environmental Quality

The Council on Environmental Quality (CEQ), established by Title II of NEPA, was charged with the oversight of the federal government's compliance with NEPA. The first chairman, Russell Train, set aside his position with the Conservation Foundation to establish the new agency. The coordination activities of CEQ provide the umbrella structure under which the EIS has become operational. Under Executive Order,<sup>36</sup> the CEQ issues guidelines to federal agencies that define procedural compliance. To this end the CEQ can be given credit for establishing in law the basic structure of the EIA.<sup>37</sup> CEQ issued the first guidelines for carrying out the EIA process in 1970, 1971, and 1973.<sup>38</sup> In 1978, CEQ issued comprehensive regulations binding all federal agencies, implementing all procedural

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<sup>36</sup> Protection and Enhancement of Environmental Quality, Executive Order No. 11514, Section 3(h), 35 Federal Register, March 5, 1970, p. 4247.

<sup>37</sup> Prior to the issuance of the CEQ guidelines there was no relevant experience to draw on in the preparation of an EIS, except technology assessment and food and drug protocols. The early statements were characterized as floundering, superficial and a bureaucratic example of excessive paperwork. By 1978, with the final issuance of CEQ guidelines, most agencies had learned to make intelligent use of the process (Caldwell, 1989).

<sup>38</sup> 35 Federal Register, 7391 (1970), 36 Federal Register, 7724 (1971), 38 Federal Register, 20550; codified at 40 Code of Federal Regulations (CFR), s1500 (1973).

provisions of NEPA and subsequent Executive Orders.<sup>39</sup> These regulations are all in effect, they apply to all federal agencies and potentially all actions of the executive branch, excluding only the President and his immediate staff and the implementation of the pollution control statutes by the EPA. Beyond the preparatory EIS guidelines outlined by CEQ, it requires:

- A detailed description of the proposed action including information and technical data adequate to permit a careful assessment of environmental impact;
- Discussion of the probable impact on the environment, including any impacts on ecological systems and any direct or indirect consequences that may result from the action;
- Discussion of any adverse environmental effects that cannot be avoided;
- Alternatives to the proposed action that might avoid some or all of the adverse environmental effects, including analysis of costs and environmental impacts of these alternatives;
- An assessment of the cumulative, long-term effects of the proposed action including its relationship to short-term use of the environment versus the environment's long-term productivity;
- Any irreversible or irretrievable commitment of resources that might result from the action or which would curtail beneficial use of the environment.

The final impact assessment must include a discussion of problems and objections raised by other federal, state, or local agencies, private organizations and individuals during the draft statement's review process (CEQ, 1981). To the extent possible, the CEQ (1993) has outlined the procedural process to uphold the "substantive goals" (p. 151) of the policy.

The familiar EIS procedure has received most attention, but the CEQ has also provided guidelines for other processes such as The Environmental Assessment (EA) which is a concise public document that analyzes the environmental impacts of a proposed federal action and provides sufficient evidence to determine the significance of impacts. The Findings of No Significant Impact (FONSI) is a public document that briefly presents the reasons why

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<sup>39</sup> 40 CFR, parts 1500-1508 (1990), Executive Order 11514, as amended by Executive Order 11991 (1977) Congress did exempt EPA from NEPA's requirements for certain statutes, furthermore, EPA has maintained, and the courts have upheld, its use of the "functional equivalence" doctrine to avoid NEPA compliance (Environmental Defense Fund v EPA, 1973).

an action will not have a significant effect on humans and the environment and therefore will not require the preparation of an EIS. The Record of Decision (ROD) is a public document that reflects an agency's final decision and rationale behind that decision, and commitments to monitoring and mitigating actions. And finally the CEQ has introduced "Cumulative Impact" a concept which can be closely associated with long-term comprehensive man and environment relationships.

The CEQ describes the Cumulative Impact as the "big-picture." Cumulative impact on the environment results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency, federal or non-federal, or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (CEQ, 1993).

Because the Act requires each federal agency to "consult with and obtain the comments of any other agency which has jurisdiction by law or special expertise with respect to any environmental impact involved" in preparation of an impact assessment, the CEQ has provided guidelines on impact areas (NEPA, Section 102(C)). This basis for consultation is designed to provide the interagency means for cooperation and expanding the breadth and scope of impact assessment. NEPA coverage is very broad from the familiar areas of air quality, air pollution control and wildlife, to the less familiar areas of microbiological contamination, radiation and radiological health.

The CEQ has been effective in persuading agencies to voluntarily adopt its guidelines. Because the CEQ lacks both the statutory authority to enforce agency compliance and the inclination to forge an aggressive oversight role for itself, it is unable to sanction the agencies for any non-compliance. The CEQ has tactfully, however, relied upon the environmental

litigants and the courts to accomplish what it could not.

With limited statutory authority, the CEQ has focused on oversight by initiating studies and training sessions. Studies performed during 1992 showed the CEQ providing evidence that Environmental Assessments were not being used as envisioned by the regulations, and that the Cumulative Impact analyses are often limited in scope. Such findings initiated agency implementation activities like the 1992 agreement between the United States Forest Service and CEQ, which resulted in revised NEPA regulations at the Forest Service. CEQ (1993) has worked with NEPA professionals in the field to discuss methods for implementing national policy that relate to conserving biodiversity. These "wake-up" calls, within a well publicized framework, described as "policy workshops" can often have a significant impact on agency and professional behavior.

To generally improve the EIA process, NEPA training is available in courses offered by federal agencies, universities, and private entities such as the Department of Justice courses and American Bar Association courses designed for government and private lawyers. Agency personnel attend courses in EIS preparation and review procedures. Universities, like Duke University School of the Environment, offer week-long NEPA courses (CEQ, 1993). The CEQ has not, however, had a major influence in training or education for the general public.

CEQ has made major advances in policy areas outside NEPA as well. During the early 1970s, CEQ worked toward the development of a comprehensive set of policies to address the nation's environmental problems. The CEQ was responsible for bringing together a wide range of new policy recommendations to the President and the Congress, relating to clean air and water, toxic substances, safe drinking water, surface mining, endangered species and in other areas. According to Russell Train, this era at CEQ represented "the most



comprehensive set of initiatives produced in any domestic area in the history of the country" (1993a, p. 5).

The CEQ has been instrumental in the development of amendments to the Clean Water Act, the Toxic Substances Control Act, The Resource Conservation and Recovery Act and the Safe Drinking Water Act. During its formative years, CEQ laid the groundwork for almost all current environmental legislation except for Superfund and asbestos control legislation (Alm, 1988). The EPA now takes the lead in many areas which during the early years would have been the CEQ's province.

According to Caldwell (1989), the CEQ to date had not received the widespread support of the executive office. Although the Nixon administration initially demonstrated a strong commitment to NEPA and environmental initiatives, it later advocated a reversal in some environmental policies. The Ford administration followed the reversal trend (Vig and Kraft 1990 and 1984). This lack of support was most evident during the Reagan presidency. After trying to abolish the Council totally—which could not be done because it was established by the Congress—the administration cut its budget and staff by 85 percent.<sup>40</sup> With support from the Bush administration, Deland, the CEQ Chairman, brought a near dead agency back to life with funding and staff that doubled the Reagan allocations (Vig and Kraft, 1990). While there was some headway being made to restore the vitality of the CEQ, the overall purpose of the Council, to make it an overseer and catalyst for NEPA's survival, has largely been lost in the United States (Caldwell, 1989).

Moving into the mid 1990s, President Clinton was faced with a provision to eliminate the White House Council on Environmental Quality and to vest its authority with the EPA.

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<sup>40</sup> Conclusions on Presidential support for the CEQ can be reinforced by a review of the Office of Management and Budget, Budget of the United States Government, 1975, 77, 80, 82, 85, 87, 90 and U.S. Civil Service Commission, Federal Civilian Workforce Statistics, 1977, 80, 83, 86, 89.

Prefacing this move, the Office of Environmental Policy was created and ultimately legislation was introduced (Senate Bill S171 in 1993) to elevate EPA to Cabinet level.<sup>41</sup> In 1996 this legislation is considered inactive and the Office of Environmental Policy has been absorbed into the CEQ under the Chairperson of Kathlene McGinty. This proposed change was however supported by Carol Browner, the Administrator of the EPA (Environment and Public Works Committee hearing April 1, 1993). This cabinet-level EPA post would put EPA on an equal budget and administrative level with major departments like energy and defense in the United States government.

The CEQ is currently involved with the President's Council on Sustainable Development. The activities of this Council are further explored in Section 7.3.

#### **6.1.6 Factors Encouraging NEPA Implementation**

Enforcement of this Act is a constitutional responsibility of the President and the executive agencies. The substantive provisions of NEPA are fully enforceable through executive orders issued by the President as well as through legislation. According to Caldwell (1989) full enforcement awaits a President motivated to invoke the Act in its most comprehensive dimensions. President Bush claimed the title "Environmental President," but full enforcement of NEPA remained untouched. Beyond President Bush, the future was first seen as more promising: not since Secretary of the Interior Morris Udall, had an environmentally inclined politician been more vocal and politically active on the environment than the new Vice-President, Al Gore serving with President Clinton. Gore in Earth In The Balance (1992) describes his commitment to environmental balance at all levels of society including the political and constitutional responsibility of the President. The environmental

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<sup>41</sup> The Clinton Administration has formally agreed to a request from concerned Senators about the dismantling of the CEQ, that if this provision is passed, an Executive Order will be issued that will formally create the Office of Environmental Policy within the White House.

component of the first administration of President Clinton is generally described as a continuation of a trend toward self-regulation (see Section 6.2) while maintaining a strong regulatory compliance framework.

#### **6.1.6a The Courts**

Historically it cannot be said of the courts that NEPA has been ignored. In fact, the courts are given credit for moving the process forward in the face of political pressure or bureaucratic inertia. Melnick (1983) cites NEPA as the major reason for "a new era in administrative law" (p. 219). There are three basic reasons why the level of court activity in NEPA has gone beyond what might normally be expected in policy implementation: presidential neglect, ambiguous language, and the provision for citizen suits in legislation.

This situation could have been prevented had the decisions on NEPA policy that should have been taken by the President to hold agencies to NEPA principles been enacted. Instead the executive branch of government declined its responsibility and the NEPA principles have been subjected to "trial-by-combat" within the courts. The public and the environmental organizations turned to lawyers and litigation for action which the executive branch could have initiated and implemented (Caldwell, 1989).

Litigation has thus become a point of access for environmental groups and citizens to agency decision making. Commenting on the situation in the early years, CEQ states that "One of the most striking and significant developments in environmental law is the right of citizens to take to court federal agency actions affecting the environment" (CEQ, 1972, p. 122). Many who have analyzed the courts' impact have argued that it was only the courts insistence on the strict application of NEPA in the early days of the law that forced agencies to write EISs at all, and to take the information in the EIS seriously (Andrews 1973 and 1976; and Liroff, 1976).

The early court cases struggled with procedural questions regarding the EIS aspects of NEPA—who should write it, when it should be written, and what kinds of projects are exempt (Claff, 1977). The courts have addressed issues of NEPA most often in areas where no EIS was prepared, with an inadequate EIS the second most common complaint. Since 1985 the number of cases filed per year has varied from 150 to a low of 60 (CEQ, 1993, pp.164-65). The courts have given NEPA and its principal action-forcing provisions some clarity of meaning, substance, and vitality. Judicial policy making has extended NEPA's meaning "beyond anybody's wildest dreams" (Barfield and Corigan, 1972, p. 338) and clarified many of the vague policy declarations.

A former judge on the United States Court of Appeals for the D.C. Circuit, Harold Leventhal (1974), has argued that it is the court's responsibility to guarantee that agencies take a "hard look" at all factors when making their decisions (pp. 509-555). For agencies whose primary purpose is the distribution of benefits or constructing public works this hard look must, according to NEPA, emphasize environmental variables. For the United States agenda, the courts have been there to push NEPA through the system.

The courts have played a dual role by providing both a broadening and narrowing of the meaning of NEPA. NEPA has been broadened to cover both direct and indirect effects of a proposed project. This brings factors such as increased traffic or secondary development into the EIA process. In 1992 the court extended the scope of NEPA to include specific protection for recreational use and aesthetic enjoyment. Participatory rights were again protected by the courts, when it was determined that decisions made without public involvement give rise to the harm that NEPA seeks to prevent (Natural Resources Defense Council v. Lujan, 768 F Supp. 870 D.D.C., 1991).

The narrowing of NEPA's scope is seen in the *Kleppe v Sierra Club* (1976) ruling

where the court decided that an EIS is not required until there is some final proposed action to review. This action reduced the effectiveness of the Calvert Cliffs v AEC 1972 decision where the EIS was to be used as an overall agency planning aide; an unfortunate turn of events for CEDM.

There are serious limitations associated when judicial activism as a predominant external force directing policy implementation. In NEPA's case, over-emphasis on procedure to satisfy potential judicial review has caused the agencies to become chiefly concerned with the preparation of a legally adequate EIS. A review of NEPA related court decisions indicates that the "Supreme Court has only upheld decisions that support the procedural aspects of NEPA and not substantive considerations" (Farber, 1987, p. 20). The merits of the impact statement process as envisioned by Congress, its utility as a public information document, and its utilization as a planning and decision tool, have been lesser considerations. It is not surprising that many agency personnel associate NEPA with litigation instead of the man and environment principles under which it was enacted (Cortner, 1975).

According to the Environmental Law Institute's analysis and findings, court decisions have converted NEPA from a national environmental policy act into a national environmental procedures act. Currently, the statute is useful more in aiding intra-government coordination, but not in helping the United States define a national strategy for environmental protection (Rosenbaum, 1974; Henderson and Pearson, 1978; Mandelker, 1981, and Wenner, 1982).

This court room activity reflects the unique role of the courts in America, where they have long been recognized as the third branch of government. With American's cultural

tendency to turn every dispute into a legal one, this is not a surprising turn of events.<sup>42</sup> Even as the courts dominate NEPA, there is a trend toward negotiated settlements, negotiated rule making and alternative forms of dispute resolution which is likely to increase into the 1990s (Wenner, 1990, p. 206).

The development of alternative forms of dispute resolution are led by state initiatives which have received the full brunt of "Not In My Back Yard" (NIMBY). An example of an early cooperative process involved a Wisconsin pulp mill siting that would require an impact assessment. Described as a "proactive approach to industrial siting," the Governor of the state directed the Department of Natural Resources to use a team research and management system, with representatives of Wisconsin's government, academic community, and private sector, to determine and implement an environmentally sound approach to future pulp mill siting. In this case the "dispute" was handled by a team approach with the intent to:

- focus the study participants' talents and skills on the critical areas of the study plan where their expertise was needed;
- structure the participants around specific tasks, rather than isolating them as representatives of government, industry, or the public; and
- facilitate communication and share expertise by having participants serve on various task forces.

The uniqueness of the project lies in the powerful mix of expertise included in the project team, and the pro-active, cooperative nature of the effort (CEM Message, 1989).

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<sup>42</sup> Time Magazine estimated that approximately 20,000 American lawyers now specialize in environmental matters. Many prominent firms such as the Philadelphia based Morgan, Lewis and Bockius have approximately 45 environmental specialists out of 650 lawyers engaged with the firm. The pace of environmental law growth is exemplified by the rise of environmental specialists at the New Jersey law firm of Pitney, Hardin, Kipp & Szuch which has grown from 5 in the mid-1980's to 30 some five years later. This firm expects to have 60-70 environmental professionals by 1994 (Sanders, 1990, p. 54).

This was in sharp contrast to the litigious atmosphere surrounding industrial siting environmental impact assessment handled through the courts and a significant application of CEDM principles in practice.

In 1993, keeping issues out of the courts but still providing for economy and the environment, Citizens for a Better Environment (CBE) originated a mandate to bring together labor and community activists to develop strategies to cut toxic pollution. Their placard reading:

**Get To Know Your Local Polluter**  
**Good Neighbor Agreements Carve**  
**A New Niche For Citizen Action**

provides a proactive citizen approach that focuses on consensus building during the impact evaluation and planning process, permitting process, and on to the day-to-day operations of industry in a community. Good neighbor agreements are aimed at breaking the NIMBY cycle by creating a new mechanism for negotiation between communities and industry (CBE, 1992).

#### **6.1.7 NEPA Policy Objectives Implementation Dynamics**

Dynamic relationships surround NEPA and the EIS process. Several of the most significant are explored below.

##### **6.1.7a National Overview Process**

In the same year as NEPA was signed, President Nixon, by means of a Reorganization Order, restructured a number of federal environmental offices and activities into a new, independent executive branch agency, the Environmental Protection Agency. Today, this Agency is the largest regulatory agency in the Federal Government, it employs over 17,000 persons who work in Washington, D.C., it also has 10 regional offices and 26 research facilities located around the country. The NEPA process could not have a bigger

anchor entrenched within the bureaucracy.

The EPA maintains oversight of the EIS process and by authority provided by the New Clean Air Act (1970) the agency also has a precedent setting agenda for an ecological overview process that complements the NEPA objective. In the Clean Air Act, Congress gave the EPA the mandate to comment on "any matter relating to" its duties, responsibilities, or authority, including those only indirectly related to the agency's specific statutes. Section 309 of the Act also gave the EPA the mandate to review and comment on certain federal agency actions that were excluded from NEPA's impact statement requirements, including proposed regulations and proposed legislation.

Accordingly, the EPA can address NEPA's policies which recognize that "each person should enjoy a healthful environment...and to contribute to the preservation and enhancement of the environment." NEPA recognizes the balancing of trade-offs that must occur in the decision making process by promoting the "use (of) all practicable means and measures...(to) fulfill the social, economic, and other requirements of present and future generations of Americans" (Section 101). The Clean Air Act, Section 309 magnified EPA's role in the environmental oversight of actions by other federal agencies, regardless of whether those actions meet the NEPA threshold requirements characterized as actions significantly affecting the quality of the human and natural environment. This oversight was to be by the nation's specialists within the major environmental agency in the country and was to be a public exercise, allowing public access to the process.

Overall, EPA can reinforce the CEQ mission under NEPA. As an "environmental watchdog," the EPA works with the federal, state, and local agencies. The Agency pursues its mandate through a multi-pronged negotiation and consultation strategy, as well as legal action when negotiation fails.



### 6.1.7b The Public

Public decision making is not seen as a side issue today, and some of the most prominent work in this area is being carried out through The National Academy of Sciences, The National Academy of Engineering and the National Research Council. The EPA chairs and sponsors an extensive network of work groups aimed at improving the public discourse on the environment. Public perceptions and understanding of the complexities of the environment have become a focus for creating a "functional citizen" as described by Caldwell (Caldwell and Siddiqi, 1976 and Caldwell *et al*, 1976).

Some of the most promising avenues are through the development of effective risk communication. The risk communicators of today are again calling on the historical passages of Thomas Jefferson, as did Caldwell, when they speak of the policy-making problems we are facing today:

If we think (*the people*) not enlightened enough to exercise their control with a wholesome discretion, the remedy is not to take it from them, but to inform their discretion (Covello *et al*, 1989, p. 3).

This concept is what effective risk communication is all about: "citizens have a right to participate in decisions that affect their lives and the things they value, the public should be informed so they can be solution-oriented, and communication is a two way activity based on mutual respect, trust and the open exchange of information" (Covello *et al*, 1987, p. 3). Risk communication, understanding, and the implementation of risk limitation may well support what Caldwell is looking for in the 1990s when he calls for a reopening of the debates surrounding man and environment relationships, or what is really at risk!

While there does not seem to be a scholarly analysis of this issue, within the professional community there is the view that business has come to rely on government/public/business gridlock as a protection against unwanted environmental

policies; knowing that an issue will be debated and in the pipeline for months or years allows an attitude of "wait-and-see" by all concerned. With gridlock avoided, environmental initiatives should develop faster and with more focused intent.

### **6.1.7c Citizen Suits**

The 1970 Clean Air Act also ushered in the day of an innovative regulatory enforcement device, the citizen suit. A parallel action has since occurred in every federal pollution statute to date.<sup>43</sup> Through this provision, any adversely affected individual is authorized to seek injunctive relief against a source who violates the Act or against the EPA should it fail to perform one of its mandatory duties under statute (Clean Air Act, Section 304). Environmental groups use this provision as a potent instrument for applying external pressure to agencies to implement environmental law and their accompanying time tables. In this manner, the public is able to force compliance deadlines.

NEPA actions are the environmental topic that has most occupied the courts, followed by pollution control, energy/public trust, and toxic materials cases. Although litigation has been instrumental in implementing NEPA, Caldwell has continued to argue that litigation has also proved to limit the comprehensive nature of the full NEPA mandate.

A major role for citizen suits into the later half of the 1990s is foreseen either through direct litigation or through reporting incidents to local authorities. With enforcement accomplishments rising each year, the EPA has in place an Enforcement Four-Year Strategic Plan, which initiates targeted enforcement approaches (EPA, 1992). The EPA is actively encouraging the public's role in enforcement by advising the public on their rights and the procedures to take when environmental compliance is inadequate and/or regulations are seen to be lax. This action involves the public as EPA's mechanism to enforce regulation through

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<sup>43</sup> The only exception is the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

industry's fear of public reprisals in the courts, as much as through validated claims.

#### **6.1.7d International Extensions**

In February 1992 the United States signed The Convention on Environmental Impact Assessment which was negotiated under the auspices of the Economic Commission for Europe. 1992 also saw the EIA reinforced as an international decision-making tool for the integration of environmental considerations into the decision-making process at the international Conference held in Rio de Janeiro (United Nations Conference, 1992.) By January, 1993 the CEQ was developing guidelines to implement the Convention findings in relation to projects with significant adverse trans-boundary environmental impacts.

The CEQ also acts as a consultant to other countries in formulating the EIA process. In 1992 CEQ staff met with delegations from Russia, Spain, Cameroon, Malawi, Egypt, Korea, China, Japan, France, and Italy, among others, to discuss the process and its role in federal decision making. The CEQ may also act as a regulatory arm to other countries. The CEQ helped to develop the draft EIA regulations and the legislation for the Protocol on Environmental Protection signed in 1991 by the United States and other Antarctic Treaty participants. The Pelosi Amendment (22 U.S.C. 262m) requires that the United States executive director of each multilateral development bank abstain from voting on loan proposals that have a significant impact on the environment unless the proposal is accompanied by an EIS or a comprehensive environmental summary (CEQ, 1993). This type of EIS requirement has been picked up by funding agencies in Europe, such as the European Bank for Redevelopment and Development which now requires the preparation of an EIS prior to project funding.

It is important to note that NEPA, as first introduced in the United States, did not have any previous regulatory pattern to follow, it was an innovative act in comprehensive

environmental decision making. The EIS has since been adopted around the world. This is expressed through the European Community, as well as the Organization for Economic Cooperation and Development who have endorsed the concept of the EIS. The European Community has adopted the EIS principle and member states have initiated legislation.<sup>44</sup> The EIA is becoming a part of the Eastern European legislation and codes of practice as these countries develop environmental infrastructures and future practices.<sup>45</sup>

While many countries are opting for the EIS process, it remains to be seen if any international "adoptions" can be more closely linked with CEDM as the process develops. Early EIS observations in the United States noted the tendency to use the process "after-the-fact" (Andrews, 1973) and on the international scene similar "growing pains" may be taking place where, for example, EISs are being called for in Saudi Arabia to substantiate predetermined site and operations developments (Confidential client). The EIS as a "candid assessment of alternatives" after decisions have been made, provides nothing more than "end-of-the-pipe" project justification. Under this type of application the EIS is neither representative of CEDM or justified in such a stated intent.

Another international issue is the degree of public involvement and interaction, where, for example, in Britain, early "scoping," a cornerstone of CEDM, has not been formally adopted (Petts, personal meetings and communications, 1993).

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<sup>44</sup> EC Directive 85/337 directed EIA implementation within member states. The 12 member states represent various levels of EIA integration and procedural implementation. For a complete update on the current European EIA perspective, the University of Manchester, EIA Centre provides complete European updates on the progress of EIA within the Community.

<sup>45</sup> Croatia enacted regulations in 1984, Poland and Latvia in 1990 followed by Albania, Bulgaria, Serbia, Kazakhstan and Russia in 1991 and Lithuania and in the Czech Republic in 1992. Hungary, Romania, Moldova, Estonia and Belarus have EIA legislation pending.

### **6.1.7e EIA Principles and Process Integration**

Undoubtedly, the interpretation of the EIS in the United States and internationally, is evolving as a "greater degree of comprehensiveness in environmental policy is likely to be of increasing importance in the 1990s and beyond" (Bartlett, 1990 p. 236). Environmental impact assessment principles are beginning their integration within policy and program development as an effective mechanism toward comprehensive decision making involving economic and social integration. Internationally, administrative approaches are being studied for fuller environmental integration. For example, the United Nations Economic Commission for Europe in association with the United States EPA agrees that the assessment procedures for projects can and should be applied to policies, plans and programs.

The process is extending beyond the original professional disciplines. For example, the social scientists are now looking at NEPA's EIS as a model for developing techniques aimed at assessing the social effects of environmental change and policy interventions. The methodology behind the EIS provisions of NEPA associated with risk assessment and technology assessment have been utilized as the core of a developing methodology to assess the consequences of global change. Specifically, a set of methods, collectively known as Social Impact Assessment (SIA) methodology, has been developed that could be adapted to the problem of assessing the effects of global change. Whereas the EIS emphasizes environmental impact, this methodology is more focused on human systems (National Research Council, 1992).

The land-use planners, long associated with the environment, are now recognizing their profession as integral to both overall community structure and environmental sustainability needs. Land-use planning provides a community framework within which environmental implications can be integrated. The Netherlands applies the environmental

impact requirement to a variety of actions and encourages city and county general planning to utilize the environmental impact process. In the most progressive applications, communities have implemented the EIS process to develop comprehensive land-use plans. Aiming at sustainable environmental quality and economic growth, such communities are implementing forward plans to maintain their resource bases.

Canada is seen as a leader in this area and has established the Environmental Assessment Research Council (1984) to look for the ways and means to achieve long-term sustainability of Canadian resources through more informed environmentally sound decision-making at all levels of government, industry and society. The Council papers on the subject intricately link the assessment process with other planning and management instruments to support the environment and economic growth view point (Jacobs and Sadler, 1990). This application of sustainable, integrated environmental, economic and social planning is growing in various communities around the world. This expansion and evolution was an issue addressed by Caldwell as integral to CEDM as early as 1964.

NEPA policy contributions to the CEDM paradigm is illustrated through the reinforcing and balancing factors relating to Caldwell's priorities.

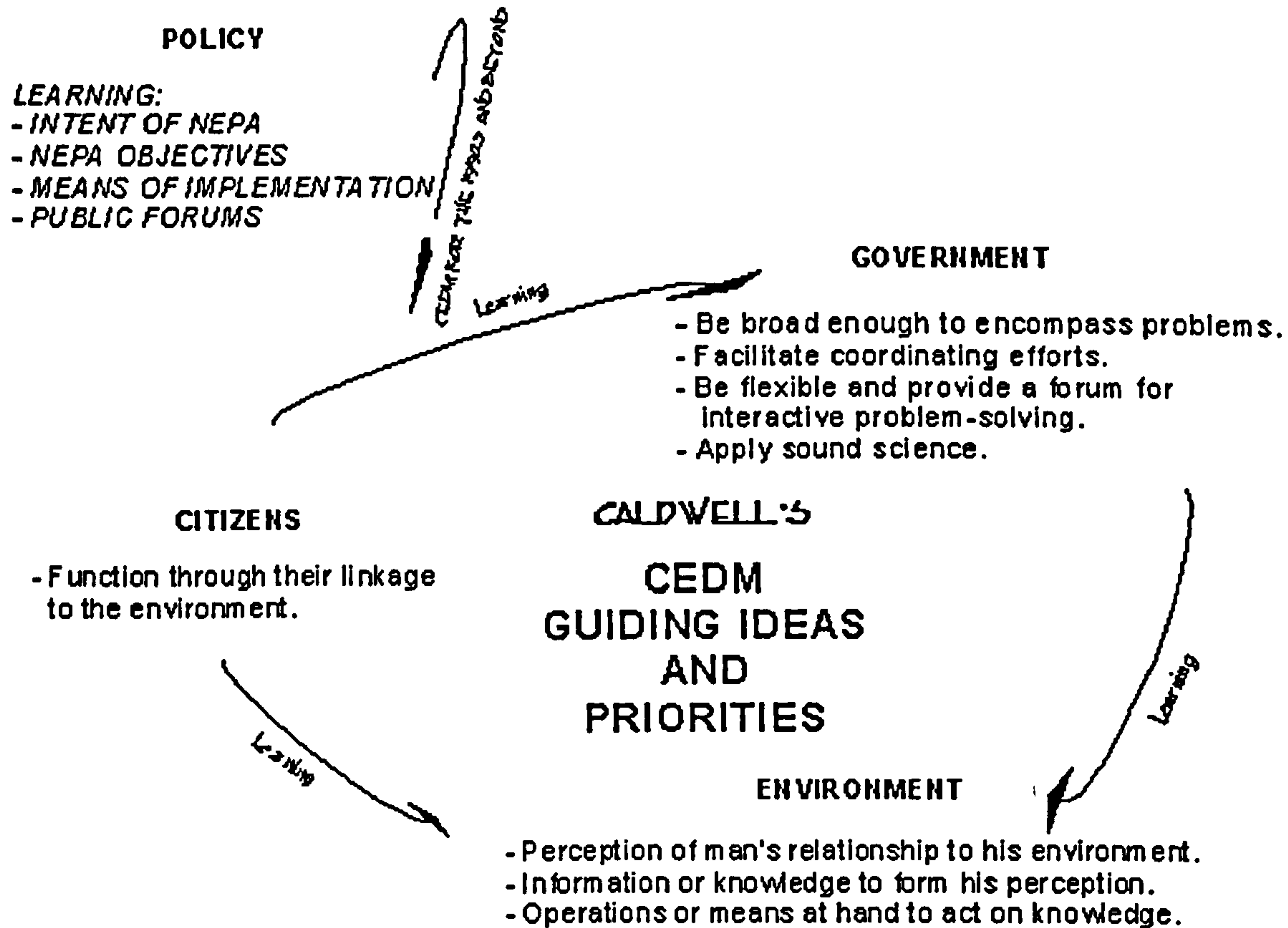


FIGURE 9 NEPA'S CONTRIBUTION TO CEDM LEARNING

## 6.2 POLLUTION PREVENTION POLICY ACT

The origins of pollution prevention legislation can be found in an Office of Technology Assessment (OTA)<sup>46</sup> 1986 report "Serious Reduction of Hazardous Waste." This report was the first to crystallize a number of issues about the implementation of pollution

<sup>46</sup> The OTA was created in 1972 as an analytical arm of Congress. OTA's basic function is to help legislative policy-makers anticipate and plan for the consequences of technological changes and to examine the many ways, expected and unexpected, in which technology affects people's lives.

prevention within a public policy context in the United States.<sup>47</sup> Following this introduction, the EPA delivered its report on waste minimization to Congress which further acknowledged that the environmental option of waste reduction had undisputed environmental and economic benefits (OTA, 1986).

Congress became increasingly interested in the prospect and by 1987 the Subcommittee on Environment, Energy and Natural Resources of the House Committee on Government Operations requested a special report to bring into focus the congressional policy options associated with reducing the generation of all hazardous wastes and environmental pollutants. The follow-up report from the OTA in 1987, examined the effectiveness of the limited federal actions taken thus far and summarized what industry, state and local governments had done to implement waste reduction.

At the time Congress had not explicitly said that EPA's historical low priority for waste reduction was inconsistent with regulatory program goals, nor had the EPA been directed to spend significant resources on waste reduction. In fact, up to that time, Congress had not debated a major program representative of a concerted national effort to reduce the generation of hazardous wastes and environmental pollutants at source. The OTA report noted that without a congressional directive to do otherwise EPA would pursue only limited activities, no institutional or organizational change would be forthcoming and very low funding for waste reduction actions would be initiated. In order to implement any change in

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<sup>47</sup> The technology for reducing the generation of waste and environmental pollutants had been known for decades. Some concepts were developed in the 1980's when waste minimization was added to waste and hazardous waste regulation in 1984, but at the time not much attention was paid to waste reduction. From a public policy perspective, waste reduction was at the issue development stage at the federal level, although several states had moved beyond this level of development. Other regulation amended in 1986 (Example: Superfund which addresses identification and associated financial responsibility for clean-up of hazardous waste) did little to consider the potential benefits of reducing the generation of waste. Congress did not require even the examination of waste reduction as a way to help create a comprehensive waste management system.



the status quo of EPA's historical direction,<sup>48</sup> Congress would have to provide direction.

Waste reduction was first seen as the non-magnatory Congressional response that was to "combine the environmentalism of the 1960s with the economics of the 1980s (OTA, 1987, p. 44). The OTA therefore advised Congress to address this issue through new legislation for the following reasons:

- "First and foremost, waste reduction represents up-stream pollution prevention that is different technically and philosophically from the end-of-the-pipe pollution control basis of existing statutes." In this section the report notes that the government and industrial response to current regulation had resulted in strategies, technologies, principles, policies and environmental specialists that are not appropriate for waste reduction.
- "Tacking waste reduction onto existing legislation, such as the Resource, Conservation and Recovery Act (RCRA), has not resulted in waste reduction receiving priority." At the outset, waste reduction was not perceived as an add on to the predominant command-and-control regulation. Through earlier trial-and-error initiatives, the need for a major change in regulatory policy was acknowledged.
- "Waste reduction must address all hazardous wastes and environmental pollutants or opportunities will open up to shift waste between media." This recognizes the effects of earlier regulation which fundamentally served to move pollution from one medium to another.
- "Waste reduction is best addressed by government policies aimed at assistance,

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<sup>48</sup> There is extensive literature on the United States control-and-command environmental regulation of the 1970s and 1980s. Irrespective of the extensive efforts: many environmental problems do persist. Sites contaminated by pollution from the past (and present) still await clean-up; "many cities still strive to meet clean air standards; and too many coastal, wetland, and forest ecosystems are being degraded by pollutants and harmful practices" (CEQ, 1993, p. xiii).

persuasion, and institutional commitment." This new direction for government policy was differentiated from the command-and-control patterns of the earlier regulation. It provided for new cooperation patterns between industry, society and government.

- "Waste reduction bridges the environmental and industrial competitiveness areas of national concern." The economic and environmental costs of waste to industry, government and society were accepted, waste reduction offered a "near-term opportunity to reduce costs and liabilities" (1987, pp. 44-45).

There was no one triggering event that made the United States reexamine its behavior and the consequences of twenty years of historic environmental regulation. It was a host of environmental, economic, crisis and cultural issues that may well continue to be examined into the next century.

To implement such a new type of legislation, the Congress was given a collection of instruments to consider and integrate within the current regulatory system. The point of pollution prevention from Congressional thinking was not to build a new pollution empire, but rather to get all programs to adopt the strategy in their current structures. Assistance to industry was a high priority providing for: in-plant technical assistance, information and technology transfer, education and training, and generic research and development on commonly used processes and materials. Other priorities concentrated on the EPA itself, an organization that would have to be changed to carry out this new legislative agenda. The OTA was calling on the EPA to provide commitment to waste reduction through voluntary initiatives, a far cry from the "command-and-control" orientation of EPA regulatory compliance.

Pollution Prevention was a logical concept, but at the time considered revolutionary in environmental reform circles. Pollution prevention was described in EPA's discussions with

Congress in the early 1990s as offering the unique advantage of harmonizing environmental protection with economic efficiency. Pollution prevention was seen as the "big picture" with its application bridging two key issues: economic competitiveness and reductions in hazardous pollutants. It was an attempt to show that economic growth and preservation of environmental quality are not mutually exclusive.

Beyond the EPA this policy needed to move throughout the entire federal system and out to industry and to the public. Instruments were to be established to coordinate with economic and industrial agency concerns within and outside the government. Information analysis was seen as an important policy instrument to provide the data necessary to establish whether waste reduction was having a positive impact on waste management nation-wide.

Earlier command-and-control regulation was not to be abandoned, but enhanced through this initiative. To accomplish this regulatory analysis would have to be done to determine the current obstacles to waste reduction. It was clear that Congress was not sure that waste reduction could be achieved by voluntary actions and only through regulatory analysis could the feasibility of waste reduction regulations be determined, in case information should show that the non-regulatory efforts to promote waste reduction were not successful.

Congress was faced with the need for research and development into waste reduction technologies. Industry could not bear the brunt of the costly research and development needed to determine waste reduction opportunities within the complex processes of industrial operations. Beyond the initial research and development information that needed to be funneled to industry, government was to play a leading role in outreach programs and workshops. The OTA (1987) advised Congress that "as difficult as it may be to introduce flexibility into the regulatory system, the long-term environmental and economic benefits of

doing so may more than justify the attempt" (p. 52).

### 6.2.1 Congress Acts

Following this Congressional introduction and interpretation of pollution prevention, several bills were presented, with the Pollution Prevention Act (PPA) of 1990 finally passing quietly, tucked within a budget reconciliation package at the last hour of a legislative session.<sup>49</sup> The PPA was first introduced as Senate Bill 585 by Senator Frank Lautenberg, a Democrat from New Jersey, on March 15, 1989. That same day, its companion legislation House of Representatives Bill 1457 or "The Waste Reduction Act" was introduced in the House by Representative Howard Wolpe, Democrat from Michigan. After their introductions, the House Bill was fast-tracked through, reported out of the Energy and Commerce Committee and adopted by a full voice vote about one year later. The Senate Environment and Public Works Committee was slower to act and the Committee reported the Bill to the full Senate without hearings. The 101st Congress was presented with the Bill by Rep. Wolpe in its last hours with immediate passage only assured because it was linked to the United States Budget Bill.

The heart of the PPA is expanded reporting requirements under the Emergency Planning and Community Right-to-Know Act Section 313 Form R. The Act revised the facility reporting to include:

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<sup>49</sup> Reilly's legislative agenda on pollution prevention was being advanced at the same time as the Congressional bills, it was however entangled in the bureaucracy of interagency review. It was the Office of Management and Budget (OMB) reviews of the EPA packages that introduced market-based measures and numerical reduction goals into the proposed EPA legislation which caused the delays and final breakdown of the EPA agenda, allowing the Congressional agenda to advance forward. The EPA bill was also being developed as an amendment to RCRA, Congress was however not going to look at RCRA in 1990. The long delays with EPA battling with the Congress and OMB was putting the EPA agenda behind the states, (at the time) thirteen of which had already passed state pollution prevention laws. With the realization that its own pollution prevention bill would not be introduced in Congress, by late 1989 the EPA generally expressed support for all 'waste minimization bills' in Congress and scrapped its comprehensive pollution prevention bill.

- The quantity of the chemical entering any waste stream (or otherwise released into the environment) prior to recycling, treatment or disposal during the calendar year for which the report is filed, and the percentage change from the previous year.
- The amount of the chemical from the facility that is recycled (at the facility or elsewhere) during such calendar year, the percentage change from the previous year and the recycling process used.
- The source reduction practices used with respect to that chemical during such year.
- The amount expected to be reported under the above for the two calendar years following the calendar year for which the report is filed.
- A ratio of production in the production year to production in the previous year.
- The techniques used to identify source reduction opportunities.
- The amount of any toxic chemical released into the environment that resulted from a catastrophic event, remedial action or any other one-time event not associated with production processes during the reporting year.
- The amount of the chemical from the facility that is treated (at the facility or elsewhere) during such calendar year, and the percentage change from the previous year (Pollution Prevention Act, 1990).

One of the key issues of Community Right-to-Know is its ability to empower citizens to participate in the policy process because it removes, at least in part, one barrier to participation, lack of relevant information. While the majority of citizens of the country are in the early stages of realizing the availability of information and how to use it, these prospects have been realized by many environmental and environmental advocacy groups as an indirect incentive for industry to undertake self-regulation.

Right-to-Know is an information policy, enacted into law, not a typical federal regulatory program, that opened up a new relationship among government at all levels, federal, state, local industry and the private sector, environmental and other public interest organizations, and the general public.

To further highlight the significance of this type of information, Good Neighbor Agreements entered into by the Dow Chemical Corporation are giving the public the ability to license their operations in the community. According to Delaney (1992), in order to maintain the license it is key for business to be up-front, honest and open, and to develop a

true partnership with their communities. The Chemical Manufacturers Association (CMA) slogan "Don't Trust Us, Track Us" may appeal to the majority of citizens who have an inherent distrust of industry.

These expanded reporting requirements were seen by Congress as a step toward making it easier for third parties (the public and agencies) to review the Form R contents and determine whether meaningful waste reduction had been achieved. A facility's "claim" to waste reduction could be confirmed.

The Act also created a Pollution Prevention Office within the EPA<sup>50</sup> to implement strategies promoting source reduction. EPA was required to establish standard methods for measurement of source reduction; review regulations to determine their effect on source reduction; coordinate source reduction strategies among federal agencies; assure public access to data collected under federal environmental laws; and to create a clearinghouse to disseminate information on source reduction technologies to business (Pollution Prevention Act, 1990).

#### **6.2.1a Costs of Pollution Control**

Market-based incentives had emerged as a key element in EPA policy initiatives following the successful passage of a permit trading plan<sup>51</sup> in the acid rain provisions of the Clean Air Act Amendments of 1990. Energy taxes continue to be on the table and may well be realized by the end of the century. The EPA Administration has made this general

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<sup>50</sup> EPA created the Pollution Prevention Office in the summer of 1988. At the same time, the EPA also began to develop its Pollution Prevention Strategy, coordinated by a Subcommittee of the Pollution Prevention Advisory Committee, with input from all EPA program and regional offices.

<sup>51</sup> The Clean Air Act presented a ground-breaking new marketable permit program for air emissions to help a non-attainment area meet Clean Air Act goals, potentially paving the way for other areas nationwide as they strive to attain air standards using less expensive alternatives to current command-and-control rules. California's South Coast Board became the laboratory for the rest of the country on this initiative in 1990-91. Tradeable pollution permits reinforces the marketplace as a supporting approach to a cleaner environment.

approach a top priority because of its potential to achieve the same or better environmental results while at the same time costing less to industry and to the public and/or by redistributing costs.

The total annual costs for all pollution control activities in America (at 7% interest) have increased and are projected to increase as follows: (see Figure 10)

**FIGURE 10 POLLUTION CONTROL COSTS IN THE UNITED STATES**

	1972	1987	1990	2000*	2000**
<b>Total Annualized Costs (in billions of 1986 dollars)</b>	26	85	100	148	160
<b>Total Annualized Costs (in billions of estimated 1990 dollars)</b>	30	98	115	171	185
<b>Total Annualized Costs (as percent of GNP)</b>	0.9	1.9	2.1	2.6	2.8

Note: \* At present level of implementation \*\* At full implementation  
 Source: Carlin, Alan (1990). Environmental Investments: the Cost of a Clean Environment a Summary.

Pollution prevention proposes first, the carrot to encourage industry to take voluntary actions to identify and exploit cost-effective prevention opportunities. This encouragement is pursued through a series of cooperative efforts designed to improve the understanding of the full costs of pollution and the benefits of prevention, and to act upon this knowledge.

### **6.3 SCIENCE ADVISORY BOARD FINDINGS AND THE ENVIRONMENTAL PROTECTION AGENCY**

The Science Advisory Board (SAB), clarified an earlier EPA undertaking, "Unfinished Business: A Comparative Assessment of Environmental Problems" (EPA, 1987)

calling on the EPA to protect the environment of the future by applying a strategic approach today, "one that involves the cooperative efforts of all segments of society" (EPA SAB, 1990, pp. 1-2). This SAB report is seen as providing the principal underpinning on which pollution prevention policy is based on in the United States.<sup>52</sup>

"Unfinished Business" is described as a landmark study by the EPA, in which for the first time in the history of the agency, the many environmental problems of concern to EPA were compared to each other in a non-programmatic context. The report called into question the traditional role of the EPA over the past twenty years and challenged the EPA to change its reactive role (although understandable when seen in its historical context) to a preemptive role that sees its responsibility not as a uncoordinated series of administrative environmental programs but as an integrated targeted approach with the priority to lessen the threats to both public health and the local and global environment. The SAB recommendations guiding EPA into the 1990s and beyond are:

- EPA should target its environmental protection efforts on the basis of opportunities for the greatest risk reduction.
- EPA should attach as much importance to reducing ecological risk as it does to reducing human health risk.
- EPA should improve the data and analytical methodologies that support the assessment, comparison, and reduction of different environmental risks.
- EPA should reflect risk-based priorities in its strategic planning process.
- EPA should reflect risk-based priorities in its budget process.
- EPA—and the nation as a whole—should make greater use of all tools available to reduce risk.
- EPA should emphasize pollution prevention as the preferred option for reducing risk.
- EPA should increase its efforts to integrate environmental considerations into broader aspects of public policy in as fundamental manner as are

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<sup>52</sup> The report committee was composed of 39 distinguished scientists and other experts from academia, state government, industry and public interest groups. The SAB, established in 1978, is an on-going research and advisory body in the U.S. It is considered to be the advisory panel for scientific policies in the United States. A counterpart of the SAB is the National Advisory Council for Environmental Policy (NACEP). NACEP advises the EPA on implementing pollution prevention and the integration of environmental and international economic interests.



- economic concerns.
- EPA should work to improve public understanding of environmental risks and train a professional workforce to help reduce them.
  - EPA should develop improved analytical methods to value natural resources and to account for long-term environmental effects in its analysis (EPA, SAB, 1990a)

Besides urging Congress to adopt this priority direction the GAO also stated that the EPA should measure the effectiveness of its programs differently, not by the number of enforcement actions but by measuring actual improvements in the environment's condition as a test of how well its programs are doing. The GAO reiterated that pollution prevention is crucial to America's future (Hembra, Director of GAO's Environmental Protection Issues Division, March 7, 1991).

The challenge to Reilly was to actively translate the SAB recommendations and findings, as well as Congressional mandates, into agency actions. Reilly during the early 1990s was implementing what he had advocated during his tenure at the Conservation Foundation (1987), that there would be

public consideration of a new approach to environmental protection (*and that there should be*) a fundamental change in concepts, in laws, and in the organization structure of legislative and executive branch activities.

To move the nation in a new direction with some consensus, Reilly recognized that rational thinking and a kind of democratic citizenship would be required. It also required much more from the regulatory agency providing approaches to rational thinking. Reilly's ideas follows the earlier argument of Ruckelshaus that the agency must be willing to explain and be able to communicate, and most of all, it must admit the uncertainties buried in its calculations. Only then can appropriate decision making take place. An informed citizenry was clearly seen as a requirement for any long-term effort.

The EPA now had as its Administrator the past President of the Conservation Foundation/World Wildlife Fund. The mid 80s saw Reilly and Train leading a formidable

international campaign for advancing emerging ideas for resolving environmental problems. Their various "Conservation Forums" advanced policies that were sensitive to the environment and to social and economic implications. Reilly (1989) gives credit for his commitment to ethical values to Russell Train, who was also the force behind Caldwell's bid for the design of NEPA.

Listening to the stakeholders, Reilly had for years recognized the growth or environment debate that was developing in the United States. Based on both the background of the agency and the professional character of Reilly and Train, the EPA was beginning to move toward self-regulation after years of rigid control regulations. The history of environmental regulatory enforcement in the United States, indicates that compliance ability depends on three critical factors that affect whether regulated parties can and will comply with regulation:

- Capability—does industry have the resources to come closer to behaving as expected by regulators?
- Feasibility—are the regulations such that competent individuals can comply?
- Motivation—what will make industry want to comply?

These levels of compliance are illustrated in Figure 11, and the actions necessary to achieve self regulation in Figure 12.

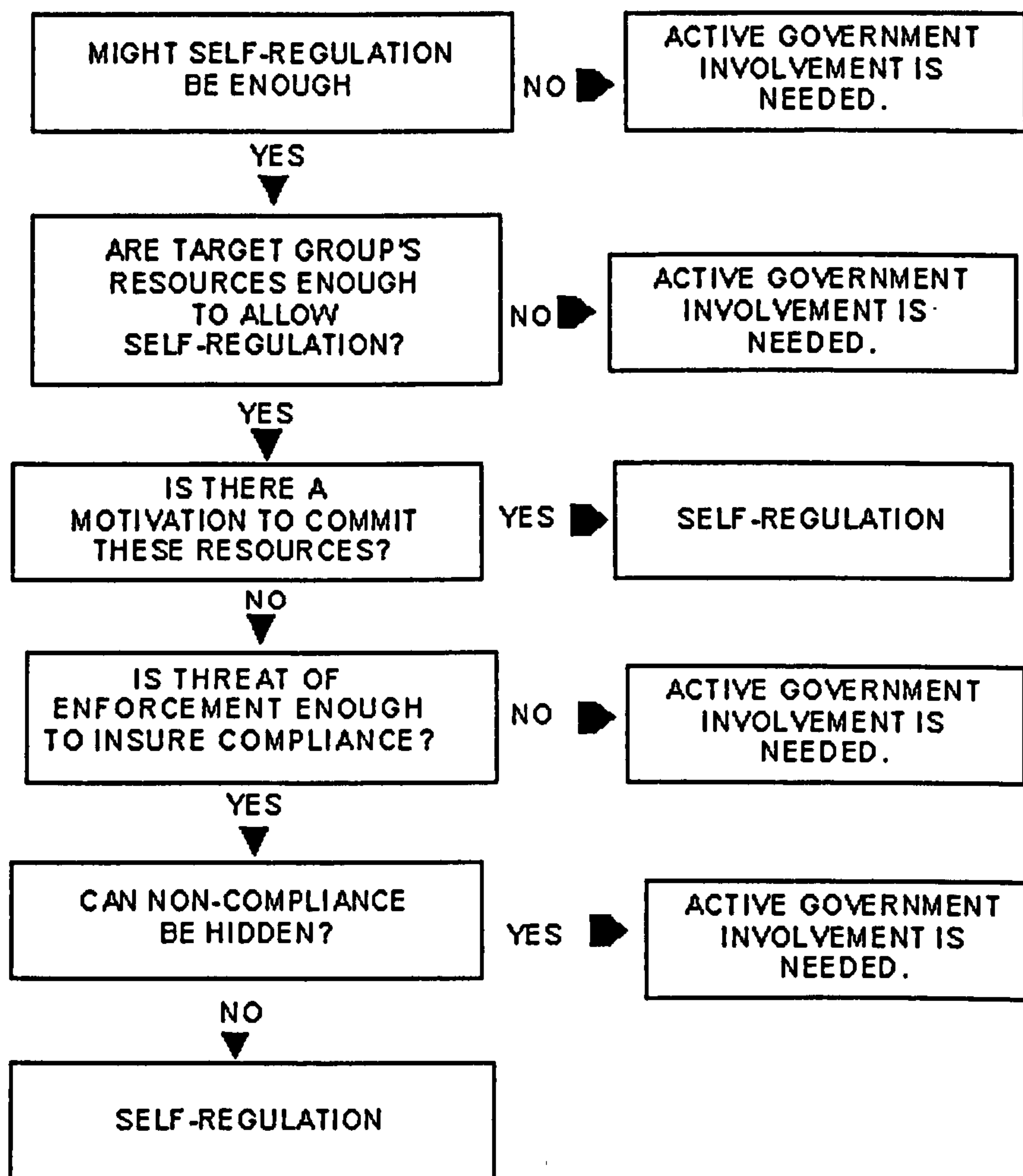
**FIGURE 11 FACTORS AFFECTING REGULATORY COMPLIANCE**

Source: Cohen, Stephen and Kamieniecki, Sheldon (1991). Environmental Regulation Through Strategic Planning.

1.	Capability	+	Motivation	+	Feasibility	=	Highest Probability of Compliance
2.	Capability	+	Motivation	-	Feasibility	=	Low/No Probability of Compliance
3.	Capability	-	Motivation	+	Feasibility	=	Low/No Probability of Compliance
4.	Motivation	+	Feasibility	-	Capability	=	No Probability of Compliance
5.	Feasibility	-	Capability	-	Motivation	=	No Probability of Compliance
6.	No Feasibility	-	Motivation	-	Capability	=	No Probability of Compliance
7.	Motivation	-	Feasibility	-	Capability	=	No Probability of Compliance

**FIGURE 12 SELF-REGULATION FLOW CHART**

Source: Cohen, Stephen and Kamieniecki, Sheldon (1991). Environmental Regulation Through Strategic Planning.



#### 6.4 POLLUTION PREVENTION IMPLEMENTATION

"Pollution Prevention is an evolutionary concept and is charting a new course for environmental policy" (Reilly, 1991a, p. v). With the Congressional pollution prevention initiative already in focus, the new Administrator took action to initiate pollution prevention strategies in the agency as a top priority. As an oversight measure Congress required the agency to place five pollution prevention staff members in the Office of the Administrator (Environmental Policy Alert, October 16, 1991).

With pollution prevention in the mind-set of EPA, a proposed pollution prevention strategy was printed in the Federal Register in January 1989. By November 1990, EPA had

reported to Congress the strategy and in January 1991<sup>53</sup> the final version was made available. EPA's pollution prevention strategy survived the struggles with the OMB forces and this signaled the higher administrative support for implementation of the strategy as envisioned by Reilly and the EPA staff. EPA's pollution prevention strategy,<sup>54</sup> represented the most complete plan for promoting pollution prevention to date.

It also provided an early operational definition. With the "understanding" that pollution is generally produced through manufacturing and chemical use, agriculture, and energy production and consumption, pollution prevention was applied to the activities of each:

- Manufacturing or when certain products are used commercially or by consumers—prevention of this can happen in three ways:
  - Changing inputs/reducing reliance on toxic or hazardous raw materials;
  - Process changes/increasing efficiency/improved maintenance practices; and
  - Changing outputs/reducing reliance on toxic or hazardous products.
- Agricultural pollution can be prevented by:
  - Development and adoption of low input sustainable agriculture practices that eliminate the wasteful use of inputs such as fertilizers, pesticides, and water; and
  - Soil erosion and land management practices that prevent erosion of sediment and the runoff of pesticides and fertilizers;
- Pollution from energy production and/or consumption can be prevented by:
  - Increasing energy efficiency to reduce the generation of pollutants associated with the extraction, refining, and use of fuels; and
  - Increasing reliance on clean renewable energy sources or alternative less polluting fuels (EPA, 1991, p. 10).

The strategy addresses the EPA objectives of incorporating pollution prevention into

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<sup>53</sup> The EPA Strategy was printed in the Federal Register, on Tuesday, February 26, 1991.

<sup>54</sup> While the prepared strategy is considered a starting point, the EPA had employed pollution prevention efforts in a concerted fashion prior to the formal presentation of the document to Congress.

every level of the agency "from drafting regulations to making grants to enforcing permits" (EPA, 1991, p. 2). It outlines a prevention initiative following the identification of a pollution prevention issue involving overcoming barriers to pollution prevention, expanding public participation and choice, working with other federal agencies, investing in the states, outreach and training, regulation and permits, enforcement, and research and analysis of substitute technologies and products (p. 19). The industrial toxics program is a non-regulatory program representing the first of many projects ultimately aimed at pollution prevention. The regulatory component of the strategy follows the requirements of the PPA on expanded industry reporting requirements. Overall the strategy looks to "incorporate pollution prevention as a fundamental principle of the Agency's mission to protect human health and the environment" (p. 1).

Following the creation of the Office of Pollution Prevention and Planning in 1988, Reilly designed a financial jump-start to accelerate pollution prevention activities through an agency-wide 2% set aside to fund early pollution prevention projects. In 1989 Reilly announced an Agency-wide competition designed to stimulate new and creative initiatives in pollution prevention. Twenty five proposals were selected and awarded funds.

The programs were diverse and ranged from kindergarten environmental curriculum development to technology research to community planning.<sup>55</sup> Early outgrowths of the 2% program were the EPA efforts to encourage small business to practice pollution prevention through the launching of a financial assistance program for small companies that wanted to employ new pollution prevention technologies. The 2% fund also produced state-industry projects like the state of Minnesota and 3M's EPA funded project to identify statewide

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<sup>55</sup> See "Pollution Prevention Fact Sheet: EPA's 2% Pollution Prevention Projects," Summer, 1990 for a complete listing.

emissions of toxic substances and rank them according to the most severe threats to communities. From that information, industries would be targeted for release reductions.

Ultimately grants have been given to universities, states, industry, research institutes and private initiatives, all with the central aim of pollution prevention advancement. The multi-media state grant programs receive a priority in funding allocations, with a Congressional authorization of \$8 million for the first three years, beginning in 1991 following the passage of the Pollution Prevention Act.

1991 also saw the Office of Program Planning and Evaluation moved to the Office of Pollution Prevention and Toxics (OPPT), where it remains today. At the time there was some concern in Congress that this move would restrict the Agency from attention to pollution prevention practices to the more immediate, chemical-specific concerns of the then named Office of Toxic Substances. In response to this concern, Congress included language in the Fiscal Year (FY) 1992 appropriation to require the creation of a Pollution Prevention Policy staff reporting to the Administrator.

This concern appears to have lessened over the ensuing years as the Pollution Prevention budget has grown and the prevention approach has in fact become the dominant culture in OPPT.

Funding for OPPT's pollution prevention activities in the President's FY 1997 budget proposal includes: \$2.3M for base activities, including \$1.4M for the Environmentally Preferable Products Initiative, \$5.5M for the Environmental Justice grants; \$2.1M spread around the regions for pollution prevention demonstration projects; and \$980,000 for the base Design for the Environment activities in the EPA headquarters. In addition the program has about \$4.5M to support the sixty federal staff in OPPT. While these amounts are expected to go down somewhat at actual appropriation, the OPPT as a whole is seen as a

viable well entrenched culture and policy domain within the government. Carol Browner, the current EPA Administrator, continues to reinforce and expand the pollution prevention legacy left by Reilly. The OPPT's current organizational chart (Figure 13) illustrates the linkages OPPT is making in the government's EPA policy network.

The OPPT, under the management of a Director and Deputy Director, is responsible to the Assistant Administrator for Prevention, Pesticides and Toxic Substances for implementation of those activities of the agency that are mandated by the Toxic Substances Control Act (TSCA); the Asbestos Hazard Abatement Act of 1984 (ASHAA), the Asbestos Hazard Emergency Response Act of 1986 (AHERA); Section 104 (i) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1986 (CERCLA), Sections 313, 322, and other sections of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA) and the Pollution Prevention Act.

(This organizational structure crosses all media and is ecosystem based. The interrelationships of this office impact the medium control divisions of EPA historically linked to air, water and waste.)

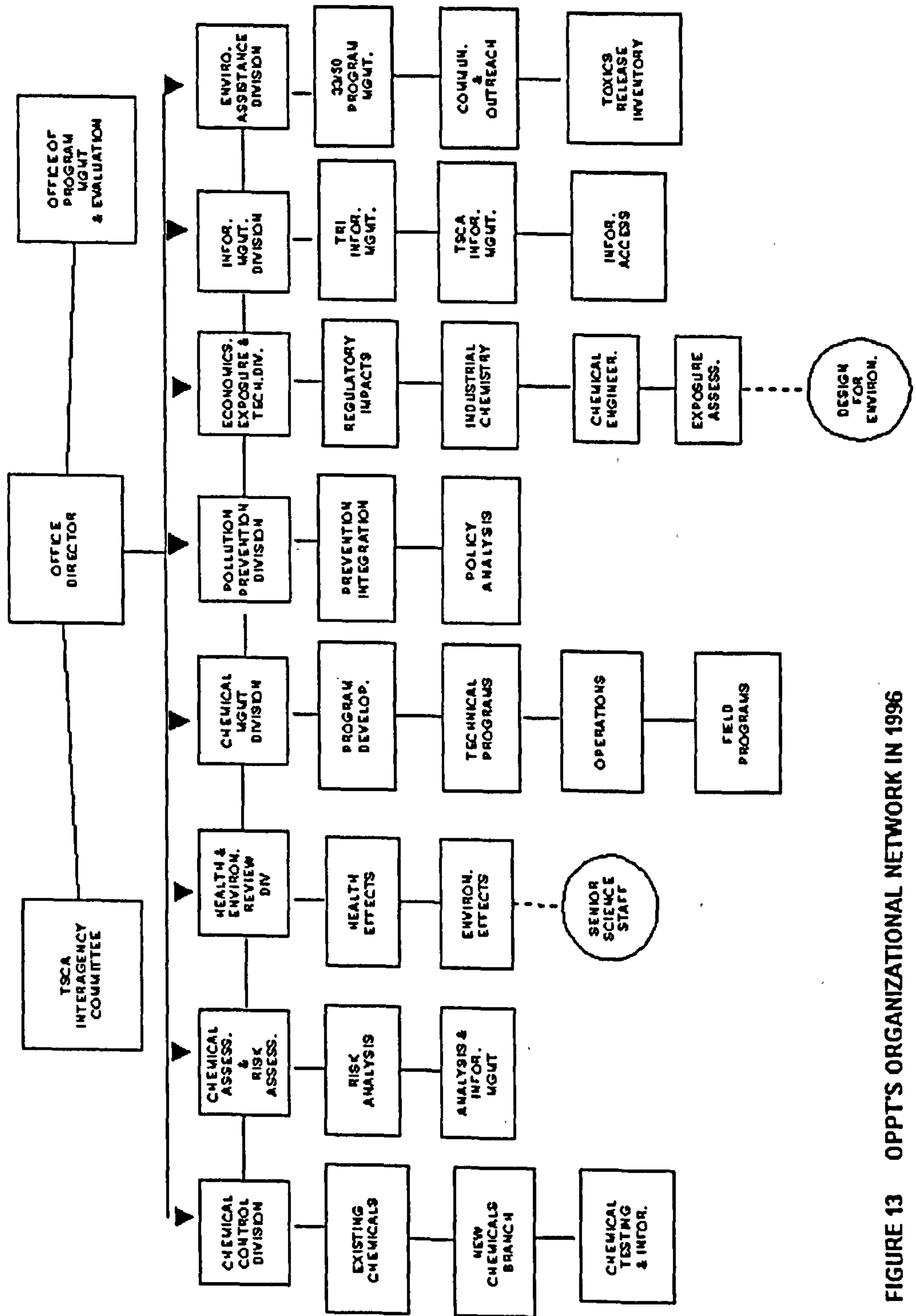


FIGURE 13 OPPT'S ORGANIZATIONAL NETWORK IN 1996



The Director is responsible for developing, implementing and operating Agency programs and policies for new and existing chemicals; for Design for the Environment program activities; acquisition, analysis and dissemination of the Toxic Release Information (TRI); and for the PPA. In each of these areas, the Director is responsible for information collection and coordination, data development, health, environmental and economic assessment, technical support, and negotiated or regulatory control actions. The Director works cooperatively with the Administrator's Pollution Prevention Policy staff which is responsible for coordinating, guiding, and mediating prevention activities throughout EPA. Coordination is also sought between EPA and the industrial community, environmental groups and other interested parties on matters relating to PPA.

The Clinton Administration Reinventing Environmental Regulations initiative promotes pollution prevention and industrial innovations directed toward environmental quality and economic growth.

Pollution Prevention incorporates the following action areas.

#### **6.4.1 Pollution Prevention Information Clearinghouse**

A national Clearinghouse has been developed as a multi-media source where technical, policy, program, legislative and financial information related to pollution prevention is collected and made available to industry and the public. The information may be accessed through a phone "hotline," by mail and facsimile, through access to a database or library, or through a network and outreach with users and a variety of national organizations. It is a free, non-regulatory service of the EPA.

Information can be on a general topic like guidelines to waste minimization, or on

special topics such as those prevention activities related to particular industry sectors, or technical transfer information on process technologies. Information is targeted to industry and small business as well as being of community and consumer interest. "User Bulletins" act as an information update on the system as well as advertising new additions such as a new corporate program summaries, expanded educational curricula, new access routes, and mini-exchanges set-up for special interest groups.

The system is also used as a "call for information" when, for example, case studies on a particular issue are needed to expand on a particular industry need. These case studies may be called for by state agencies, private industry, or organizations of a private or public nature and are then added to the national database.

The Pollution Prevention Information Exchange System (PIES) is the electronic conduit to information and databases, as well as being a national and international communication network. PIES is interactive and is regularly updated by users who incorporate the information they have gained through pollution prevention research, implementation, etc.

Through 1996, the information system continues to expand with, for example, profiles of companies that participate in voluntary initiatives and pollution prevention technology updates. EPA has released their newest edition of ACCESS EPA, a convenient directory of EPA's major information resources and services. Containing over 400 pages, information can be accessed through libraries, government distributors, and electronically via the Internet.

The national system, EPA regions, states, and organizations have developed "information clearinghouses" dedicated to particular community needs. An example of the extent to which a state program has advanced is the California Alternative Technology

Section Toxic Substances Control Division which has prepared hundreds of technology assessments, waste audit studies, management guidelines, checklists, waste stream studies—all available free to the public.

#### **6.4.2 Education Initiatives**

There are major pollution prevention initiatives in universities across America.

Institutions include:

- Center for Clean Technology
- American Institute for Pollution Prevention
- Technology Transfer Organization
- Chemicals in the Environmental Information Center

Prior to the 1980s, practically no courses on pollution prevention were available.

During the past few years, however, a diversified curriculum has developed in the broad framework of environmental studies. The curriculum covers a spectrum of activities that are called pollution prevention with subjects from toxics use reduction to disposal of wastes. Since a comprehensive definition of pollution prevention remains elusive, subject course materials delve into many areas.

The University of California, Department of Chemical Engineering conducted a survey of university-level pollution prevention education in America in 1991-92. Individuals (140) from 80 universities were contacted during the survey. The survey results showed a range of departments that responded, including agricultural engineering; anthropology; business and management; chemical engineering; civil engineering; computer science; ecology; environmental science/engineering; public health; urban planning and university extension programs. Of these the distribution is 66% located in Science and Engineering, 14% in the Social Sciences and Liberal Arts, 9% in Business and Management, and 11% in

the other departments (Freeman *et al*, 1992).

The business schools, which are opening their classrooms to environmental topics for the first time, are expected to be a catalyst for the pollution prevention momentum throughout all aspects of industry and government. The Tufts University program is a model example for the potential of multi-disciplinary pollution prevention education. Tufts is set-up to teach university faculty, in an open forum, techniques for the exploration of environmental issues. In this way, university students are exposed to pollution prevention issues in the context of every subject area. This model has been implemented, for example, at Northern Arizona University, where the researcher is active in their "Ponderosa Project" where all faculty is invited to meetings to discuss environmental integration into curricula.

At the elementary level, pollution prevention resources provide videos, web-site links and teaching kits.

#### **6.4.3 Expanding Public Participation and Choice**

Although the United States environmental sector contains hundreds of databases, the TRI database permits the tracking of chemical releases at specific facilities on a multi-media basis and is considered the most comprehensive national database on toxic chemical emissions. Prior to expanded reporting requirements in pollution prevention, it only touched the tip of the toxic iceberg, with more than 95% of all chemical emissions, about 400 billion pounds, unreported each year. The Pollution Prevention Act of 1990 broadens the TRI's role in recording chemical source pollution.<sup>56</sup>

During discussions in 1992 with Jessie Baskir, Pollution Prevention Strategist with EPA Region 9 in San Francisco, CA the researcher learned that expanded and clarified

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<sup>56</sup> To address the Congressional pollution prevention mandate for an expanded reporting requirement by companies, the EPA drafted a revised toxic reporting form, Form R, that included the new information required by the Pollution Prevention Act and submitted it to the OMB for review in February, 1992.

reporting, accessible to the public, is potentially considered to be the most effective regulatory tool the government could provide. The reporting is meant to address two critical areas, the first is to stimulate many questions by the public but perhaps none as important to CEDM's "functional" citizen as: What do these releases mean for my health and the health of my community? These questions posed by citizens to local government and industry promote open channels through which the "public's right to understand" is becoming more prominent as the program matures across the United States.

The second critical area is to provide a means to measure the accomplishments of the EPA's pollution prevention objectives. The overriding premise at EPA is that you cannot manage what you cannot measure.

The requirements of the reporting are in three broad areas:

- A Material Safety Data Sheet (MSDS)—a chemical information sheet;
- An Emergency and Hazardous Chemical Inventory Form—a report of the amount of certain hazardous chemicals present at a facility; and
- A Toxic Chemical Release Form (R)—a report of the amount of routine emissions into the environment from a facility and source reduction and recycling information for every toxic chemical reported.

The public has the right of direct access to all the Community Right-to-Know reporting information which is provided through established local community information centers called for in CERCLA/SARA (Comprehensive Environmental Response, Compensation, and Liability Act of 1980/Superfund Amendment Reauthorization Act). These are usually the local fire departments, or special local emergency planning centers (LEPCs).

While the government provides for stiff penalties for non-reporting or reporting

incorrect information, citizens have retained their own means to enforce compliance through their ability to sue facility owners or operators for failure to meet Community Right-to-Know reporting requirements, as well as federal and state officials for failure to carry out the reporting provisions.

TRI data has already been used to mobilize citizens to action, in Virginia the Environmental Action Foundation (EAF) has been formed and has started the Toxics Education, Action and Mobilization campaign (TEAM) in response to the behavior of eight companies who have allegedly failed to meet toxic release reporting requirements. In California, the Silicon Valley Toxics Coalition efforts targeted IBM because of its air emissions of ozone-depleting chemicals. The public attention was a central factor in IBM's rapid efforts to prevent the releases. The Coalition also published a "Citizen's Guide to the New Federal Right-to-Know Law: How You Can Get Toxics Information And Use It To Fight Pollution" which has turned out to be a well known aid for California's environmental community groups.

Community groups are not always controversial, in Illinois the Center for Neighborhood Technology (CNT) supports pollution prevention as an economic strategy. Their efforts have produced technology assistance aids for industrial application, and low interest loans for small business to implement pollution prevention (EPA, 1991a).

By June, 1996 the expansion of TRI reporting will be extended to an additional 6,400 industrial facilities. Quoting Vice-President Gore, "Putting information about local pollution into the hands of the public is the single most effective, common-sense tool available for protecting human health and the environment" (Pollution Prevention News, June-July, 1996).

EPA's Project XL (Excellence and Leadership) which promotes full stakeholder integration in an attempt to provide more public health and environmental protection at lower

cost, reinforces public involvement with a concept of "scoping" stakeholder interests in industrial operations lying outside NEPA regulatory style provisions. Under this type of government/industry program, in exchange for increased citizen involvement and audit disclosure, EPA will expedite the permitting process and will not prosecute companies that uncover, fix and report regulatory violations. EPA's new role in these types of projects has an EMS orientation associated with three elements: an EMS; compliance auditing guidelines; and a method of correcting non-compliances. The key priorities for many agency initiatives of this type are for companies to demonstrate a real commitment to prevention of pollution, continuous improvement, and a dialogue with stakeholders.

#### **6.4.4 Consumer Product Information**

Consumer product comparative risk analysis has become a research project within the EPA's agenda to design a methodology that will "...assess the environmental and health consequences of consumer products, test the methodology on sample product groups, and develop and carry out a communication plan to submit the information to the public, engineering and design schools, industry, the environmental community, and other interest groups" (EPA 1991, p. 22). As results become available, information is transferred to the Clearinghouse for distribution.

#### **6.4.5 Industrial Toxics Program**

Central to the EPA strategy is a voluntary reduction program which was already in its preliminary stages of development by late 1990. The EPA, using the TRI data to target facilities, provided the best data for identifying opportunities for toxic release reductions. The TRI data were used to indicate those companies (600) that had the largest discharges to the environment of selected chemicals. Facilities whose releases posed the worst risks to the environment became program targets. As the industrial toxics project evolved it called for

33% cut in releases of targeted pollutants to all media by 1992 and 50% (using 1988 releases as the base) by 1995.

The overall project, making a greater use of information tools such as the TRI data, provides for the development of integrated and multi-media approaches to tackle pollution, with a focus on the worst risks such as those toxic chemicals that are persistent in the environment or those which pose a high risk from exposure. This project, announced in February, 1991 "marks a new approach by EPA to encourage voluntary action by industry that minimizes the need for intrusive federal regulations." The strategy is "a very good first step, the first solid piece of work on pollution prevention that has come out (*of EPA*) to date" says an environmentalist about the agency's strategy (Inside EPA, January 11, 1991, p. 3). "If we succeed," says Reilly, "the initiative could set the pace for a new, cooperative way of addressing the nation's environmental goals and I would look for states and communities to undertake similar projects" (1991b, p. 2).

This initiative continues through 1996 with reinforcement from the Clean Air Act (CAA) Amendments of 1990. The CAA provisions relate to those companies that take on voluntary actions in an attempt to reduce air emissions. Companies participating in this program include: Bristol-Myers Squibb Company, Chrysler Corporation, Eastman Kodak, Eaton Corporation, Emerson Electric Company, Inland Steel, Monsanto, and Unisys.

#### **6.4.6 Partnership With Federal Agencies**

Partnerships are called for in the strategy to promote cross-agency integration of the pollution prevention ethic. Agencies working at cross-purposes are a long standing problem that has hampered EPA's agenda to safeguard the environment.

The largest program under this initiative began in April 1990, when the EPA and Department of Defense (DOD) signed a Cooperative Agreement to promote environmental



compliance of military bases in the Chesapeake Bay watershed. This Agreement was in support of on-going efforts to restore the Bay, an ecologically sensitive area that has a long history of contamination. August, 1991 saw four other agencies join the group, signing a Memorandum of Understanding between the EPA, DOD, the National Aeronautics and Space Agency (NASA), the Army, Navy and the Air Force to formalize the Tidewater Interagency Pollution Prevention Program (TIPPP).

Under TIPPP, the agencies are charged with developing and implementing alternative practices to reduce waste and emissions resulting in adverse environmental impacts from three facilities. The first model communities include Langley Air Force Base, Fort Eustis and Norfolk Naval Base. The effort includes all sectors of the base community including: administrative offices, materials distribution, housing/food services, new constructions, land management activities, procurement/acquisition, maintenance operations, vehicle storage and fueling areas, manufacturing and energy usage and raw materials usage. The program covers all media. The objective is to develop and implement integrated multi-media pollution prevention plans for each installation, outlining short and long-term projects that are readily transferable to other communities or national settings.

The TIPPP program is inter-agency; the DOD and NASA both have adopted Pollution Prevention Directives and Management Initiatives. While TIPPP represents an aggressive attempt by the EPA to prevent pollution, there are many other federal agencies involved in pollution prevention research and demonstration projects. The Waste Reduction Evaluations at Federal Sites (WREAFS) is an activity designed to work through pollution prevention problems with extensive technology transfer to the public and private sectors. Much of the early research on solvents, metal cleaning, spray painting and equipment overhaul, all items relevant to normal military operations and transferable to private industry,

was done on Army, Navy and Air Force bases involved in this program.

Cooperation has continued to grow with the recent EPA and Department of Commerce (DOC) signing a five-year Interagency Agreement to provide pollution prevention technical assistance to small and middle-sized business in several industrial sectors (EPA, October 12, 1993).

In 1996, examples of inter-agency cooperation can be found within the EPA and the General Services Administration (GSA) "Greener Cleaner Projects;" and in the Department of Energy where alternative energy sources are being investigated and energy savings technologies are being researched.

#### **6.4.7 Pollution Prevention Legislation and the States—and Local Government**

While the states were closely watching the EPA's long delayed pollution prevention bill, many went ahead and proposed and enacted legislation, marking a major national trend towards such laws at both the state and federal level. Massachusetts and Oregon became the first states to pass stringent legislation requiring industries to develop plans for reducing toxic emissions and wastes. In fact, while National policy and legislation are imperative for a concerted effort to a national agenda, it has been the states that have led the way.<sup>57</sup>

In early 1991, a directory to state legislation relating to pollution prevention indicated that 26 states had already developed legislation and were well on the way to pollution prevention efforts. By the end of the year, forty nine states had adopted some form of pollution prevention mainly through regulation (Writar, 1992). The states were described as leading the way to a "new age of environmental federalism." Governors are calling for the

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<sup>57</sup> Most of the states have taken advantage of the 2% 'seed money' to start pollution prevention programs. But to assure the longevity of programs, they are tied to self-funding such as fines, hazardous waste disposal fees, hazardous material use, or fee schedules as a generator or potential generator, as well as state appropriations.

federal government to mandate waste reduction, a future initiative that may force the hand of Congress to opt for more rigid pollution prevention requirements (Environmental Policy Alert, July 25, 1990).

Any state may enact more stringent requirements than those imposed through federal regulation and some have already opted for more rigid requirements. Following this avenue, many states have expanded on the TRI reporting requirements; as an example Washington covers ozone-depleting compounds under the Montreal Protocol and all TRI chemicals. Massachusetts provides for the TRI as a minimum but allows for the addition of 10 new chemicals each year.

Facility planning requirements represent an important new trend in state pollution prevention laws. This requirement adopted in most state plans, to various levels of coverage and content, provides for a key linkage to comprehensive environmental management system concepts. Facility plans cover a range of requirements, many far beyond what the federal TRI requirements outline. Those noted in current state plans include:

- a description of how the plan has been or will be incorporated into management practices and procedures;
- policy statements articulating upper management and corporate support for the plan and a commitment to implement the plan's goals;
- a description of current and past practices used to eliminate or reduce the generation or release of toxic pollutants at the facility and an evaluation of the effectiveness of the practices;
- accounting systems which identify the costs associated with toxic substances or hazardous materials, including regulatory compliance costs and liability;
- information on the amount of waste generated per unit of production output or raw

- material used, or a demonstration of why the information cannot be provided;
- identification of pollution prevention opportunities at the facility and an analysis of feasible source reduction and toxic chemical use substitute methods;
  - a list of options considered to be economically or technically infeasible;
  - analysis of impediments to implementing the available options;
  - specific pollution prevention goals;
  - identification of a strategy to implement pollution prevention options;
  - establishment of employee awareness and training programs;
  - a certificate attesting to the accuracy of the information in the plan; and
  - a written statement that, whenever technically and economically practicable, hazards will not be shifted from one process, environmental medium, or product to another when implementing the selection options (EPA, 1991a, p. 74).

Compliance with these requirements is usually tied to enforcement actions such as fines, imprisonment or at least negative publicity. Oregon has an exceptional "public enforcement" where public hearings are held for non-complying facilities or where the facility plans are "deficient." The Illinois EPA is trying out a different approach and has established a program called "Partners in Prevention" to encourage and recognize firms that engage in voluntary pollution prevention.

While the federal government does not set numeric pollution prevention goals, there are seven states that have reduction goals ranging from 25 to 50%. Hazardous waste reduction has been most in demand, tying pollution prevention to another part of federal law the Comprehensive Environmental Response Compensation Liability Act (CERCLA) and Amendments by which each state must have a twenty year assured capacity for hazardous

waste disposal (EPA, 1991).<sup>58</sup>

Some states have tied pollution prevention to their permitting process. California imposes waste minimization requirements in permits as well as in settlement agreements.

The comprehensive nature of the state programs can be shown by a review of their program activities which include: information clearinghouses; research and development activities; technical assistance and regulatory interpretation; on-site technical assistance; financial assistance to industry; waste exchanges; waste audits; workshops and seminars; conferences; surveys and assessments; newsletters; reviews of prevention plans; working with academia to promote pollution prevention; awards programs; and regulatory incentives such as expedited permit reviews, low interest loans, and grants for pollution prevention initiatives (Writar, 1992 and EPA, 1991a).

An assessment of state pollution prevention laws was carried out in early 1991 by William Ryan and Richard Schrader of the National Environmental Law Center and the Center for Public Interest Research which devised a set of criteria by which state laws could be judged. Among the criteria used was worker involvement and community involvement, assistance to users through consultations, training, research and development and the like, extensive planning and reporting with for example, plans to be certified by an overall state planner and definitions of pollution prevention that cover emissions to all media.<sup>59</sup>

The states currently view EMS oriented projects as a driver for environmental improvement.

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<sup>58</sup> RCRA waste minimization requirements are also closely associated with pollution prevention and some states have used pollution prevention reporting requirements to confirm that facilities that state they have waste minimization in place actually do.

<sup>59</sup> The panel of experts on the assessment of state laws found Massachusetts well above the rest as the 'best' law. The law did not however rate well for involvement, though the rating was high on all other factors.

#### **6.4.8 Local government**

Local government is perhaps the first line of defense against environmental degradation and has not been left out of the pollution prevention initiative in the states. Not surprisingly we can look to California as an example of pollution prevention initiatives.<sup>60</sup>

The researcher's review of local solutions revealed that promoting pollution prevention in California begins with the local staff of government agencies who act as a stimulus to industry and the community. Education and information exchanges have been established, as have roundtable discussion groups. Action Plans for educational workshops and technical assistance are facilitated through resource networks at every level. Overcoming barriers associated with financial assistance to industry has been initiated through local agencies where local lending institutions have become involved in community support programs by helping industrial development toward cleaner technologies.

#### **6.4.9 Outreach and Training**

A number of programs have been initiated by EPA to inform private industry and direct it to various strategies of pollution prevention. Three of those programs are Green Lights, Total Quality Management, and ecosystem initiatives.

Energy conservation has become part of the pollution prevention agenda with the initiation of the Green Lights Program. To participate in the program, companies or other organizations sign a Memorandum of Understanding with EPA in which they agree to install energy-efficiency lighting on 90% of their total space within five years. They are only committed to upgrades where they are profitable and provide comparable or improved lighting quality. EPA, in return, provides the participants technical support services, such as

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<sup>60</sup> The Office of Pollution Prevention (March, 1992) in Washington recommended California's local program for addressing pollution in the most comprehensive manner.

training workshops and marketing materials and information to help firms advertise their participation.

In 1991 California and Maryland were the first two states to join the EPA program. By the end of 1991 California had committed 70 million square feet of state-owned buildings with a savings of more than 603 million kilowatt hours of electricity each year or \$51M in overhead costs. By 1993 over 1,000 organizations had joined the program. The State of Maryland, which at a final project cost of \$208,749, expects an internal rate of return of 48%. This translates into the prevention of 2,681,387 pounds of carbon dioxide; 11,932,175 grams of sulfur dioxide, and 4,022,081 grams of nitrogen oxides per year. (Source: Green Lights Information Center, 1993) In 1996-97 the EPA is touting the success of its own facility with its new headquarters, covering 200,00 square feet, using the Green Lights program elements. Under the Clinton Administration, Green Lights continues to be an active program with current initiatives involving development of super-efficient products. EPA's family of programs in this area include Energy Star Buildings and Energy Star Computers.

Since July 1992, a high-level group set up by President Bush, the President's Commission on Environmental Quality, has been focusing on energy efficiency as a method for harnessing market forces as a way of improving the environment. The group is composed of senior members of industry, academia and conservation organizations.<sup>61</sup>

Outreach programs have also been initiated through the White House. A particular Bush initiative, again promoted under market forces to enhance environmental initiatives, was an industry-government agenda which included: an evaluation of the links between pollution

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<sup>61</sup> The researcher recognizes the controversy about this type of program where for example the Sierra Club accuses the EPA of "fiddling around" with voluntary programs as an excuse for not taking real action to reduce emissions. The organization does not support voluntary programs which they do not see as being a substitute for mandatory programs when for example a 20% emissions reduction is being called for by the year 2000.

prevention and total quality management. Methods for accelerating private investments in energy efficient technologies and clean energy sources; the promotion of environmentally-sound waste management practices among consumers; improving the "stewardship" of privately-held lands through programs using business-conservation group partnerships; and, assessments of foreign environmental practices and the establishment of a broad-based information exchange network are all aspects of this group's work. (Quality Environmental Management Subcommittee, 1993). The Clinton administration is expanding the early initiatives through "reinventing government" strategies all aimed at promoting less government involvement in industry while maintaining environmental quality.

Such initiatives have laid the groundwork for a change of thinking about the environment and what part it plays in overall industrial issues. This type of activity represents a government stimulus toward environmental integration within organizational structures that goes beyond environmental compliance. These early initiatives provide the background for current programs of business-government cooperation addressed under global standards for environmental management systems. About 300 U.S. companies have participated as members of the U.S. Technical Advisory Group formulating voluntary standards associated with environmental management. Pollution Prevention has become an element of the standard which is fully supported by the EPA.

EPA's "new era" has included initiatives in ecosystem planning. By 1991, the EPA had formed a new work group on the urban environment in an attempt to address city pollution problems in a "whole system" approach. This group activity is a move by the EPA to apply its new ecosystem philosophy emphasizing agency-wide solutions to problems in geographic areas. This initiative has been further developed through specific programs addressed to a wide range of systems.



The Great Lakes initiative is an ecosystem approach, with pollution prevention at the center of all efforts to clean up the Great Lakes under a pact launched by the EPA and several state (Minnesota, Illinois, Michigan, Wisconsin, Ohio, Indiana, Pennsylvania and New York) governors. On April 12, 1991 the EPA and members of the Council of Great Lakes Governors (Canada was included in a bi-national strategy) announced the United States Pollution Prevention Action Plan for the Great Lakes—an effort to clean up the ecosystem of the lakes. EPA sees the Great Lakes basin as a unique opportunity to build pollution prevention into the fabric of economic development, at a time when the region's cities and industries are in the process of significant transformation and modernization. Reilly described the program objective as wanting some of the country's top industries to demonstrate that pollution prevention makes good sense for both the economy and the environment (EPA, 1991b). To indicate the scope of the project the EPA's action plan for the basin includes:

- developing a program to protect Lake Superior by identifying critical pollutants and developing methods to stop degradation;
- working with Chrysler, Ford and General Motors to institute pollution prevention programs throughout the auto and related industries;
- launching a pilot program in Rochester and Buffalo, New York, to prevent water pollution from run-off and other non-industrial urban sources; and
- hosting an international symposium to take stock of pollution prevention efforts and plan future activities.

Additional state actions are committed to examining pollution prevention and associated state regulatory barriers to it and promoting information exchange. The project ranges from household battery recycling in Rochester, to tracking priority pollutants through sophisticated data base development. Some early outcomes from the program have resulted

in the study commission initiating a process to eliminate persistent toxics, making "the philosophy of zero discharge a reality" (Inside EPA, May 22, 1992).

Another example of an innovative ecosystem approach is the EPA's agency-wide sediments strategy which envisions a major pollution prevention role. Because sediments are affected by industries, publicly owned treatment works, combined sewer and rainwater overflow systems, stormwater discharges, hazardous waste disposal sites, and atmospheric deposition, the potential effects of the program are far-reaching. Besides preventing pollution, the strategy envisions managing existing sediment contamination using pollution prevention, source controls and natural recovery. Remediation would of course come into play in high-risk sites. The strategy will also develop "criteria" for determining when sediments pose a risk to human health or ecological systems. Once a final inventory of sites is linked to sources of contamination, permit levels "could get ratcheted down" significantly (Inside EPA, January 3, 1992).

By 1996, most states have performed a risk assessment to inform state priorities in relation to environmental hazards. The assessment process has taken account of stakeholder concerns and scientific research in dedicating funding to prioritized risks. As an example, in the state of Arizona, The Comparative Risk Assessment Project conducted over a two year period was a comprehensive study that prioritized air quality as the number one environmental risk in the state.

## **6.5 REGULATIONS AND PERMITS**

By August, 1991, the EPA had begun a high-level effort to advance pollution prevention in major rule-making. An agency-wide Senior Pollution Prevention Policy Council was established as part of a general reorganizing activity, ensuring that pollution prevention will be initiated throughout the agency. By December of the same year, two dozen rules had

been targeted by the Council for the "first systematic pollution prevention analysis" (Inside EPA, December 20, 1991. p. 17). March 1992, saw the first rule (Pesticide Manufacturing Effluent Guidelines, from the Office of Water) go through the process. Reviews of the adequacy of the attempt to incorporate pollution prevention were mixed. While the outcome of future rules will undoubtedly also meet with some confusion until a clear understanding and agreement of pollution prevention crosses all offices, this first rule did indicate EPA's seriousness about the process (Inside EPA, March 20, 1992).

The EPA has since created specific procedural steps to ensure that pollution prevention is given adequate consideration. The mandatory steps include: surveying the regulated community for information on source reduction opportunities and successes; including a discussion of pollution prevention in the preamble of each rule and inviting public comment on the issue; and training permit writers to encourage source reduction as a compliance method. The voluntary steps include a suggestion that media offices consider sponsoring surveys to collect source reduction information to test source reduction techniques.

In 1996, Pollution prevention has become inherent to air, water, solid and hazardous waste, noise, visual and aesthetic regulation in the United States. Statutory provisions in all cases specifically designate pollution prevention authority and requirements.

Multi-media permitting is being undertaken in a pilot three-state project as a first step in reshaping industrial permit writing to allow for simpler, less costly and more flexible permits, while at the same time promoting pollution prevention goals. New Jersey, Massachusetts and Kansas are the pilot states for developing the coordinated permitting process. The EPA also has a project with Amoco Corporation to examine cross-media permitting issues. New Jersey is approaching the concept by requiring the pilot industries to

submit pollution prevention plans. A permit team examines the plans and works with the facilities to create a single permit that will set control requirements for all pollutants facility-wide. Based on the success of its early pilot program, by August 1991, New Jersey had become the first state to sign into law a requirement to grant all-inclusive permits for air, water and waste emissions. By May 1992, the EPA had established New Jersey as a "testing site" for the nation-wide program (Inside EPA, May 22, 1992).

Along with this new law, New Jersey's biggest polluters will be required to identify areas of operations where sources of pollution can be reduced. All companies will have to draw up five-year plans for reducing the use and generation of specific chemicals. Achievement records must be made available to the New Jersey Department of Environment for verification (Environmental Policy Alert, Aug. 12, 1991).

Outside any pilot scheme, California has made its own efforts to consolidate all existing permit requirements for environmental programs in the state. In particular, the agency is looking to consolidate permits associated with, air emissions, water emissions, health hazards, toxic chemicals and pesticides.

Not to be outdone by the states, Regional EPA offices have incorporated waste minimization plans in permits and corrective action orders under hazardous waste regulations. In Region 3, for example, officials are seeking to include requirements that facility owners and operators develop waste reduction plans based on a guidance document prepared by the region. The Air and Waste Management Division in Region 2<sup>62</sup> is requesting that all treatment, storage and disposal facilities applying for new hazardous waste permits prepare a Waste Reduction Impact Statement.

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<sup>62</sup> EPA Region 3 includes Delaware, Washington, DC, Maryland, Pennsylvania, Virginia and West Virginia. Region 2 covers New Jersey, New York, Puerto Rico and the Virgin Islands.

The Office of Solid Waste has drafted plans to incorporate pollution prevention considerations into hazardous waste licensing as regulation is considered for Congressional reauthorization, which would incorporate uniform national requirements into laws. In this context, source reduction would become a factor requiring consideration in the evaluation of available technology. The Toxic Substance Control Act (TSCA) is also being used as an avenue to advance pollution prevention. Under TSCA, EPA's Office of Toxic Substances may ban or restrict any substance that poses an "unreasonable risk" to human health or the environment. By March, 1991 the EPA had contacted companies, requesting the manufacturers of new chemicals to submit along with their pre-manufacture notification (required under Section 5 of TSCA) information on comparative risks, pollution prevention and recycling practices planned by the submitter regarding activities associated with the manufacturing, processing, use and disposal of the new chemical substance.

The Clean Air Act is a key area where the EPA is looking for pollution prevention opportunities. As an example, language in the law's amendments passed in 1990 selecting Maximum Achievable Control Technology (MACT) specifically directs the EPA to consider pollution prevention when selecting a technology. According to Nancy Firestone (1991), EPA Associate Deputy Director, this case represents prevention as part and parcel of the rules formation and implementation. By 1996, all of the technology designations surrounding the Act have pollution prevention as an integrative evaluation element.

To support integrated permitting, the EPA process will use clustering of industries and contaminants, as well as pollution prevention approaches, to bring the agency closer to its goal of breaking down barriers between program offices in working with cross-media environmental problems. This type of cluster approach will allow rules to be written to

address all the media of concern—where as traditionally standards are set for each medium.<sup>63</sup>

Permitting innovations are generally seen as an avenue to promote pollution prevention. Industry generally supports a position against the "best available technology" approach and notes that this concept misses a major opportunity for parties to use an assortment of mixed devices while maintaining a standard. This position has been fully integrated into the EPA's Project XL through a comprehensive operating permit approach which fully integrates public comment and participation. 1996 saw the first XL project approval in the U.S. with Jack M. Berry, Inc., a citrus company located in LaBelle, Florida receiving regulatory relief in exchange for innovative efforts to solve environmental problems. Intel, while receiving state regulatory relief in Oregon, expects to be the next company receiving federal permitting under Project XL for its facility in Arizona.

## 6.6 STANDARDS

Pollution prevention has not escaped the American Society for Testing Materials (ASTM) that launched a major effort to write standards for pollution prevention. As these standards have to be agreed by consensus, it takes a long time to reach any approval. The standards are intended to address such areas as requirements for industrial waste minimization and life-cycle analysis. In an Inside EPA article in early 1992, the EPA Office of Pollution Prevention supports the initiative and acknowledges that this body could produce national standards in areas where EPA lacks regulatory responsibilities—to offer a broader pollution prevention impact on the nation's industry (Inside EPA, January 3, 1992).

Pollution prevention has been integrated within the Organization for Standardization

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<sup>63</sup> To facilitate the integrated permit process further the EPA is looking toward integrated information systems. By 1991 three systems had been implemented, IDEA (Integrated Data Enforcement Analysis), FINDS (Facility Index System) and Gateway, but these were not fully developed and a report from the GAO on the development activity generally found them lacking in true integrated use (Environmental Policy Alert, June 26, 1991). In, 1996 information technology heads the list of EPA priorities.

(ISO) Standard 14000 Series of Environmental Standards. Endorsed by the EPA, the 14001 Environmental Standard integrates pollution prevention within strategic environmental management decision-making.

## **6.7 ENFORCEMENT: INCORPORATING POLLUTION PREVENTION INTO SETTLEMENTS**

In EPA's first assessment of its progress in enforcing compliance with cross-media strategies, there is a description of the five general types of settlement agreements accepted by industrial polluters:

- **Pollution Prevention Projects**, which substantially reduce or prevent the generation or creation of pollutants through use reduction, or through the application of closed-loop techniques, employing different industrial processes, or fuel or material substitutions. Recycling technologies also may be used, but only if pollutants never make their way into the environment.
- **Pollution Reduction Projects**, which would go substantially beyond compliance with discharge limitations to further reduce the amount of pollution that would otherwise be discharged into the environment. Such projects might include recycling residuals at the end of the pipe, or improving operation and maintenance.
- **Environmental Restoration Projects** repair damage done because of violations as well as enhancing the environment around the facility.
- **Environmental Auditing Projects** require the polluter to undertake additional auditing practices designed to correct deficiencies in existing management and/or environmental practices. The audits would target practices contributing to recurring violations.
- **Enforcement-related Environmental Public Awareness Projects** include developing

publications, broadcasts, or seminars to educate the regulated community about the importance of complying with environmental laws, and to provide information on how to comply (EPA, January, 1992).

EPA's first strategy to promote pollution prevention in enforcement settlements was announced in 1990. The idea, born from a proposal submitted for funding from the 2% fund, proposed that negotiated settlements should contain provisions for as an example, recycling and substitution of less toxic substances to be traded off against reductions in a fine.

One of the early cases invoking this initiative was a consent agreement with General Electric Chemicals (GEC) which agreed to pay a reduced civil penalty of \$75,000 and to conduct environmental audits at all GEC facilities. In addition GEC and its parent company will also implement supplemental enforcement projects at a cost of over \$890,000 involving reductions in emissions or use of certain toxic chemicals (Environmental Policy Alert, June 26, 1991a).

In 1996, pollution prevention associated with environmental management systems (EMS) is a clearly identified factor within the government's benchmark guidelines on litigation. Base Fine Tables, Aggravating Factors in Sentencing, Mitigating Factors in Sentencing, and Elements of Environmental Compliance charts reflect EMS elements. These benchmarks are used in legal interpretations and judgements with the overall intent of assuring environmental compliance by stimulating industry to adopt an EMS. (Takaki, #4, 1996).

## **6.8 FUTURE STRATEGY FOR POLLUTION PREVENTION**

Pollution prevention techniques and approaches being developed through research and development at EPA were defined in EPA's "Pollution Prevention Research Strategic Plan" in 1991 and 92 (1991c). The SAB appeared to be keeping their eye on the mission of



pollution prevention and emphasized the need for a research focus on ecological impacts along with clearer definitions and a need for better agency direction.

Research is concentrated on, among other topics, the ecological impact assessment and product life-cycle assessment. The principles coming out of this early research (Batelle Institute and Franklin Associated, Ltd) are derived from the EPA and focus on implementation actions leading to a compatible balance between human activities and the ability of natural systems to support and nurture life. The framework proposed consists of three components: inventory, impact analysis and improvement analysis.<sup>64</sup> It is suggested that this type of approach may prove useful to the NEPA process as it evolves to incorporate a broader spectrum of ecosystems thinking.

An example of how research and programs have evolved to include the environment and economics, and the implementation strategies of pollution prevention, is the EPA draft watershed-based management and trading program (final version expected, April, 1997). Trading is an inherent element of the administration's regulatory initiative. Categories of trades include: point and non-point sources, intra-plant trading, and pretreatment trading. Regardless of who trades and how, the common goal of trading is achieving water quality objectives, including water quality standards, more cost effectively. Supporting the agency's belief that trading provides greater flexibility to achieve pollution reductions, the watershed trading program follows the CAA air emission trading program approach introduced earlier by the EPA. Overall environmental goals within an ecosystem context are seen to be addressed through this type of operational instrument. Implementation of the EPA's watershed information program includes resources such as: "Getting to Know Your Local Watershed," "Building Local Partnerships," "Leading and Communicating," "Managing

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<sup>64</sup> This draft report can not be cited in more specific detail.

Conflict," and "Putting Together a Watershed Management Plan." Watershed databases are supported through a Conservation Technology Information Center, a non-profit public/private partnership partially funded by EPA grants. Another data resource is maintained by the Terrene Institute. The Watershed Information Resource System (WIRS) carries 5,000 abstracts and indexes of watershed-related documents. EPA, Region 5 has published "A Watershed Approach to Urban Runoff: Handbook for Decisionmakers" along with fact-sheets directed to the non-technical audience. The U.S. Geological Survey has an increasing array of publications, and data sheets providing information. Bruce Babbitt, current Secretary of the Interior promotes the watershed approach to environmental management, linking education, information and the perception of the environment within an systems context.

Research into end-of-life strategies are becoming an inherent business aspect of EPA interests. Following the European Union's lead to adopt "take-back" policies, United States companies are being encouraged to develop voluntary programs in hopes of diverting government regulation. EPA tests the market and provides research-development grants in this area as part of the Clinton's administration Common Sense Initiative to find cleaner, cheaper, smarter solutions to environmental problems. One such grant to Union County, New Jersey has resulted in the disassembly of televisions, microcomputers, monitors, printers, microwaves, telephones etc. and parts resale. Companies like Digital and AT&T are working with the EPA to sponsor conferences and seminars where technology strategies are presented in an open forum where, for example, designers discuss how to reduce the number of different types of plastics whereby manufacturing is standardized and simplified in the earliest stages of the design process.

In 1996-97 EPA is increasing its non-governmental directions in programs such as

The International Cooperative for Environmental Leadership where the resolution of environmental problems is being addressed through the exchange of information. The National Pollution Prevention Center for Higher Education has expanded its resource lists to include, for example, full text of information relating to environmental reports, case studies, accounting, industrial ecology, etc.

While air quality trend data shows some progress (December, 1996), 80 million people still breathe air that does not meet existing health standards. To address this issue, EPA has initiated research into and proposed additional national standards designed to prevent serious health problems. Implementation of standards is expected to spur a host of pollution prevention efforts. The EPA's Stratospheric Protection Division is releasing a book in January, 1997 summarizing voluntary industry efforts in eliminating the use of ozone depleting substances.

The EPA (January, 1997) continues to highlight the economics of pollution prevention, where for example, an annual ranking of the financial performance of the top 20 firms reflects the rapid growth in businesses which promote and facilitate pollution prevention, waste reclamation and re-utilization, or the extension of infrastructure or product life.

Project XL agendas represents an agency direction toward the flexibility, innovation and design for the environment ideas touted in industry as a requirement for progress into the next century. The lack of flexibility in command-and-control regulations is being removed through these progressive pollution prevention programs. Certainly compliance is still employed, but its modification in response to these changes in concepts is a critical step forward to allowing the professional's to develop and exhibit commitment as addressed early-on by Reilly.

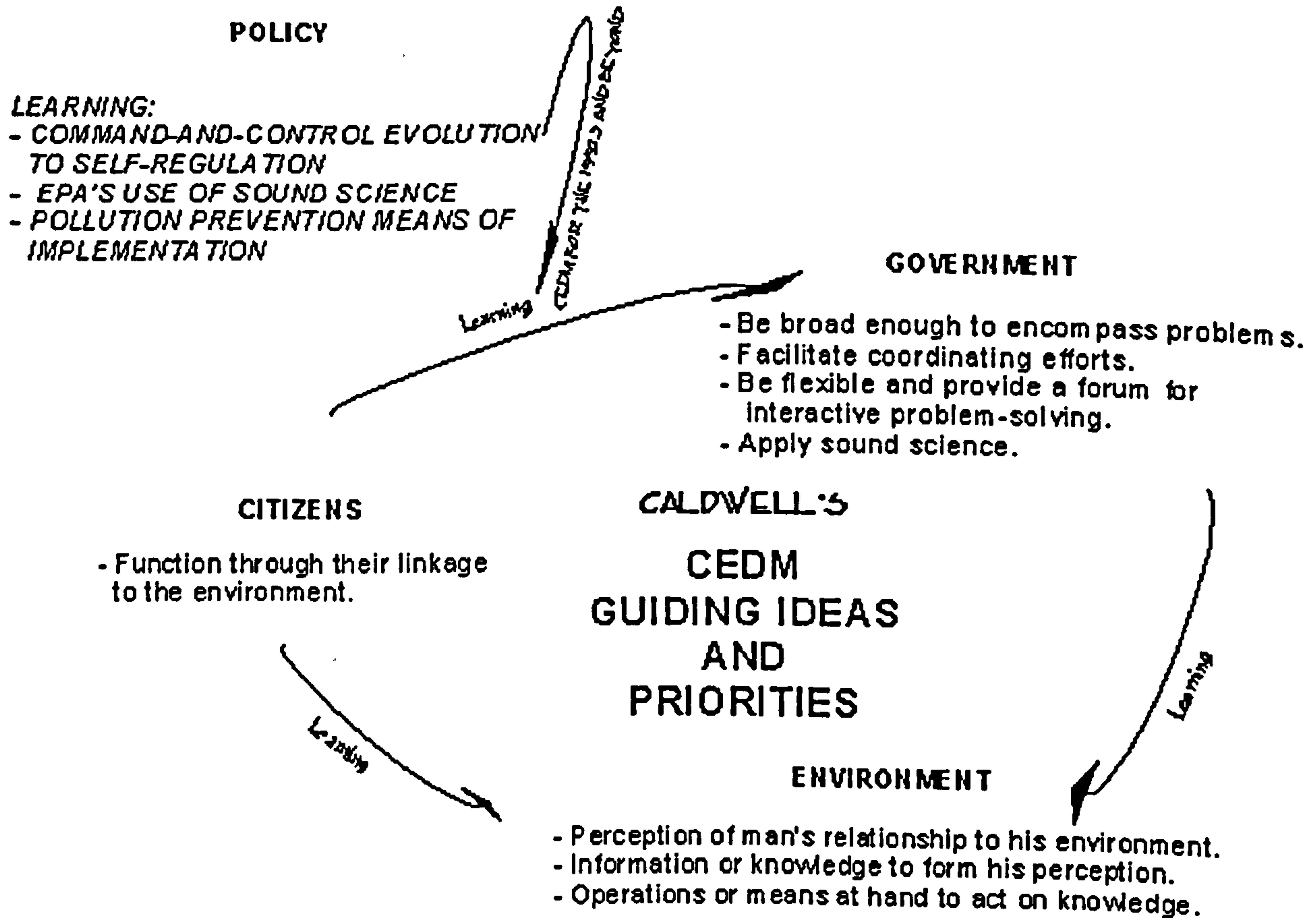
Overall the voluntary incentives established through the pollution prevention initiative remain open to debate and evaluation of their effectiveness. Believing that voluntary efforts might work better than command-and-control groups such as GEMI have tested this premise by evaluating the most prominent voluntary federal programs. The Clinton administration's Common Sense Initiative, the 33/50 Program, Project XL and the Clean Air Act Trading Program have been judged "peripheral to solving the problems that contribute to the nation's "badly broken" pollution control system. In their findings, "Congress or state governments have the power to make such incentives work"...but the mistrustful atmosphere of pollution control" must be effectively dealt with first. The mutual adversarial atmosphere of the United States remains and redefining legislation will likely include weaving incentives into law. Financial incentives to comply in efficient and innovative ways is for the most part acting as a guide for congressional directions. Legislating a better pollution control system is viewed as a long and tedious exercise of regulatory reform. Strengths and weaknesses are tied to shortcomings throughout the system, but progress is seen in the evolution of regulatory structure in the U.S. (GEMI, 1996)

In a February 1996 report by the independent Organization for Economic Cooperation and Development (OECD), the U.S. is described as entering a new phase in the evolution of environmental protection, one that emphasizes the positive relationship between a healthy environment and a prosperous economy.

Events supported by the EPA in the early part of 1997 include the DeLange Woodlands Conference on Sustainable Development; Building Energy 1997, Insuring a Sustainable Future; Public and Private Partnership for Environmental Progress; and Sustainable Transportation. The event names suggest a major departure from the earlier EPA where regulatory compliance efforts were the central focus of agency outreach.

The EPA directions toward pollution prevention adds to the learning surrounding CEDM. By contributing to government, citizen and environmental priorities, pollution prevention moves CEDM a step closer to implementation. Figure 14 highlights the pollution prevention contributions to CEDM.

**FIGURE 14 POLLUTION PREVENTION CONTRIBUTION TO CEDM LEARNING**



## **Chapter 7: ENVIRONMENT**

CEDM as an abstract environmental idea is not alone. Various forms of comprehensiveness have been dealt with in policy terms, modeling terms and in descriptive philosophies. This research investigates three man and environment symbiotic relationship theories that dominate the approach to policy as a social choice mechanism: rational ecology, holism and sustainable development.

### **7.1 RATIONAL ECOLOGY**

Rational ecology is hypothesized by Dryzek (1987) to provide structure for an operational relationship between the environment and man. His approach seeks to establish the rationality of a view of ecosystems based on the life-support approach. Dryzek's proposition expands the anthropocentric framework that has been described as narrow by Passmore (1974) and Tribe (1976). This expansion arises because rational ecology provides measures that are related to a wide variety of aspects of an ecosystem. Dryzek assumes the necessity of a symbiotic relationship between man and ecosystem through a mode of behavior centered on the basic maintenance of the ecosystem. The goals include only those necessary to sustain life.

A symbiotic relationship, as proposed through rational ecology, envisages a man and environment relationship where man acts as the problem solver, rather than man as a species like any other. The social choice mechanism is the device used by man to deal with the disparity in the relationship. The symbiotic relationship is defined through the human survival values attributed to the ecosystem and the policy mechanisms adopted to achieve those values. Attributes of environmental media, according to rational ecology, have a value in so far as they contribute to the persistence of an ecosystem that is fit for human occupation and use.

Rational ecological theory progresses through a series of operational aspects as it attempts to address the complexity of environmental decision making. The policy process mechanism is based on the concept of the minimum "utility" of an ecosystem which is equated to its capacity for production, protection and waste assimilation (Dryzek, 1987).

According to Dryzek, productive attributes include renewable resources, non-renewable resources, and agricultural products. Protection refers to "the stabilization of man's ambient environment through buffering of air and water cycles, the moderation of temperature extremes, and the regulation of the abiotic environment" (p. 34-35). Waste assimilation is the recycling of pollutants. The utility of production, protection and waste assimilation is in the context of man's relationship with the system. These provide the basic requirements for human life, and it is these values that are to be preserved by the social choice mechanism.

Rational ecology also embodies a mode of behavior that is appropriate to the attainment of the ecosystem utility. This is the decision making and decision monitoring process. Goal clarification is sought, and means are activated to guide choices and goals in the rational direction. Each of the systems or process units can be identified along with its role in promoting rationality measures. This component of rational ecology requires a continued investment of resources and effort. As a policy process supporting a utility orientation towards the environment and emphasizing problem-solving, rational ecology provides the context for an operational agenda that incorporates negative feedbacks, coordination, robustness or flexibility and resilience (Dryzek, 1987).

These criteria must be met if a policy or any social choice mechanism is to adequately cope with ecological problems which are acknowledged as complex, non-reducible, variable, uncertain and collective in nature. Dryzek recognizes the intrinsic

capacity of ecosystems to cope with problems without human intervention (1987, pp. 28-33).

This ecological rationality as a form of decision making is, as Dryzek (1987) admits "something of a novelty," (p. 55) and an attempt at "an holistic experiment" (p. 206). In his research, he cites no complete systems to use as a guide, but the approach is thought to have "real-world possibility" of implementation (p. 240).

Dryzek's work, Rational Ecology Environment and Political Economy, (1987) proposes practical goals and means of incorporating the principles of rational ecology into policy and modes of practice. Through rational ecology, Dryzek seeks to address the "web of relationships" between the environment and man. Dryzek acknowledges an element of arbitrariness in the boundaries of an ecosystem, but accepts that there is little benefit in allowing the complexity of the idea that everything is connected to everything else (Commoner 1972) to stifle the grounds on which real-world social choice mechanisms may evolve. In an attempt to find a perspective from which valid ecologically rational standards can be judged, Dryzek provides for ecosystem parameters to be established through systems thinking, taking into account a system's ability to cope with the stress or agitation manifested through interactions with humans.

### **7.1.1 CEDM and Rational Ecology**

CEDM and Rational Ecology are both of relevance in terms of their capacity to solve ecological problems; the difference is that CEDM has not been associated with a comprehensive and understandable set of criteria or guidelines.<sup>65</sup> Today, instead of constituting a standard for design or evaluation, CEDM has become a body of concepts

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<sup>65</sup> The development of environmental quality criteria is a major global industry. Scientists provide data to support or oppose criteria, lawyers provide frameworks for or against regulations; administrators try to make it work or seek loopholes when it doesn't; politicians always favor them; environmentalists promote or denounce them, and members of the general public just hope something works so their jobs and lifestyles are not adversely affected (Chapman, 1991).



without understanding. In regards to a man and environment relationship, the CEDM idea has gotten bogged down in holistic theories. Such holistic approaches, in which the environment is considered an integrated whole with properties that cannot be reduced to smaller units, was not the intent of Caldwell. Instead, Caldwell uses holistic to refer to the overall health of an ecosystem. Caldwell (1964) asks for two kinds of knowledge to be used to deal with the whole of things, "...knowledge of the substance of things and knowledge of relationships among things" (p. 12). The environment needs basically an: "expressive concept, an image, or even simple description; and a means of use or relationship with man" (p. 19). A logical prerequisite for understanding is some form of definition within an ecological, value and relational context.

Ecological rationality is a form of functional rationality (Dryzek, 1983; Bartlett, 1986) and is closely associated with human needs theory and research put forth by among others, Coate and Rosati. Coate and Rosati's (1988) theory is described in their work, The Power of Human Needs in World Society where they set about the task of exploring and explaining the complexities of the today's world through the context of a human needs approach. The work of Sites (1973) and Burton (1984) cited by Coate and Rosati provides support for the argument with Burton's supporting thesis underlining the issues raised.

It is the politically realistic observation that, unless there is development and fulfillment of needs of individuals and groups, unless problems are solved and the need for coercion avoided, a social and political order may not be stable and harmonious, no matter what levels of coercion (pp. 12-13).

Functional rationality is seen as a means to provide for (at least within symbiotic ecosystem parameters) the needs of individuals in combination with natural systems to cope with human-induced problems. It provides a stepping stone toward the human needs approach which must confront the problem of linkage between the individual and society at

all levels (Dryzek, 1987; Coate and Rosati, 1988). Rational ecology constitutes a standard for evaluation and design that effectively promotes or produces some value for ecosystem relationships (Dryzek, 1983, 1987). In any form the concept embodies both a value or values, and a mode or modes of behavior appropriate to the attainment of a value or values (Dryzek, 1987).

Ecological rationality accepts a degree of intervention in natural systems, but does not accept extreme ecological engineering or, on the other extreme, situations in which man is allowed no impact. This suggests that a positive decision can be made not to exploit, as in the case of the Antarctic Treaty arrangements. Man deals with this impact through his social choice mechanisms and these devices are society's means for coping with the linkage of social systems and ecosystems. Dryzek's work follows the earlier scholarship of Orlove (1980) which described a "procedural" approach to ecological rationality. Orlove's thesis rests on the belief that ecologically functional behavior and structure can be the product of conscious decision-making, the same attribute afforded to CEDM. Man is seen as the problem solver pursuing the achievement of an "ecologically rational man-nature system" where the human and natural components stand in symbiotic relationship (Dryzek, 1987, p. 46). The ecology premise is that only a species that affect their environment positively can survive its intervention. Extreme ecological engineering in natural systems is not expected except in the case of rehabilitation whereby a system can (again) promote human survival. According to Dryzek (1987), "Ecological rationality suggests, then, that non-intervention in natural systems is untenable. While man can destroy...he can also sustain" (p. 45).

Using the ecological rationality criteria proposed by Dryzek (1987) one can test and evaluate social choice mechanisms, in this case those of CEDM. The CEDM framework can be interpreted as a way of trying to achieve ecological rationality. In fact, ecological

rationality can serve to orient CEDM to the well-being of the ecosystem as a whole, rather than to any specific individuals, populations, or species within the system. It helps to provide CEDM with a set of utility criteria for integrating human activity within the ecosystem and moves CEDM away from the potentially devastating ideological complexity that has grown up around a term often considered "vague and opaque."

## **7.2 DEEP ECOLOGY**

The philosophical basis of deep ecology lies in spiritual metaphysics. Primarily an ethical theory, deep ecology describes a world view which ranges from advocating a return to a pre-modern type of ecological sensibility, to the creation of a explicitly post-modern eco-consciousness, to some form created from the fusion of the previous two.

The realization of deep ecology is premised on living as close to the land as possible, being in touch with its particular soils, waters, winds and inhabitants. From this closeness, man learns the ways of nature and the rhythms and patterns of nature become the guide for human laws.

Deep ecology has a central refining feature today—that of "re-enchantment" of the world. This entails an agenda for generating a new cosmology, a re-spiritualization and discovery of the mythical importance of nature. The re-enchantment thesis of deep ecology comes from its understanding of the roots of the ecological "crisis." The cause of this "crisis" is a particularly ecologically unfriendly form of human consciousness and this consciousness is changed through adoption of appropriate spiritual, religious or mystical attitude towards the world.

Re-enchantment strategy to achieve a more harmonious relationship with the world is plagued with critical problems in real world implementation. Leaders of deep ecology, in their zeal to re-enchant the political, industrial and social complex have not had a great deal

of success. As a basis for political movements and public policy little has been achieved to convince people that deep ecology should be accepted as part of a new normative orientation to the world where a spiritual commitment between each of us and the source of all life is required. A common rallying cry for re-enchantment—spiritual enlightenment—remains an ideal rather than a practical goal.

### 7.2.1 CEDM and Deep Ecology

Nevertheless deep ecology has provided an insight into a man and environment relationship that can be utilized if some adjustments are allowed. If "deep" can be understood as supporting an ethical and moral man and environment philosophy along with the associated literacy concerned with the individual accepting his obligation not to do harm, additional ground can be gained for CEDM.

In the Web Of Life, Capra (1996), deep ecology is presented as "a new scientific understanding of living systems." Supported by the new concepts of physics and the awareness of religious and spiritual consciousness, a new paradigm is offered calling for a "holistic worldview" (p. 6). Capra builds this worldview from systems thinking and moves through the origins of life and on into the cognitive nature of science and man. In Capra's theory the consciousness of man and his self-awareness arise out of the cognitive process that is common to all living organisms. Humans have a fragmented view of society, and this alienation from nature is the very essence of the problems associated with man and his environment. In his concluding remarks Capra states:

Reconnecting with the web of life means building and nurturing sustainable communities in which we satisfy our needs and aspirations without diminishing the chances for future generations. ...We need to revitalize our communities...so that the principles of ecology become manifest in them as principles of education, management and politics (p. 297).

When deep ecology focuses on principles of interdependence (understanding

relationships), recycling, partnership, flexibility, diversity, and as a consequence of all those, sustainability, it can become an effective ally of CEDM. The implementation of these principles, however become "vague and obscure" when for example, statements such as, "The implications for maintaining sustainable human communities are again obvious..." and "We need to fundamentally redesign our business and our economy (p. 299). For CEDM, deep ecology in its pure philosophical form must be dismissed. The United States political and economic interests, which this research accepts as a given, offers little hope of or even room for dialogue on spiritual-re-enchantment.

A moral theory in harmony with politics, policy and economics where deep ecology allows for principles and ethical significance without lapsing into irrational mysticism provides for an appropriate level of understanding required for operational practices. In the context of this research, deep ecology is seen as a theoretical underpinning supporting the CEDM framework, which seeks to clarify "holistic worldview" only as far as an operational paradigm at the level of environmental professionals.

### **7.3 SUSTAINABLE DEVELOPMENT**

Caldwell has already linked CEDM to the idea of sustainable ecology. Just like CEDM, sustainable development is not a new concept, but one that has received prominence in "Our Common Future" (World Commission on Environment and Development, 1987). The central theme is the integration of environment and economy, with the principal guide being the use of resources at a renewable rate. The report leaves sustainable as a vague attribute, development is not distinguished from growth, nor is there clarity in what would be a strong or weak form of sustainability. Although politically wise, the vagueness of the term sustainability equals that of CEDM. There is little agreement today on exactly how the objective can be realized with the diversified challenges facing government, industry and

society.

The issue was addressed at the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro in June, 1992 where the central theme was the idea of sustainability. The conference discussions relating to sustainability, environmental protection, natural resource adequacy and economic growth show that while such goals are fully appreciated in the international community, there is little consensus on how to achieve them or indeed what is required for these goals to be met. Sustainability now means many things to different people and can be used in any number of ways and include any number of issues.

The United States attempt at sustainable development is based on a principle laid down earlier in this research—The business of America is business. In this context the United States Secretary of Commerce, Ronald H. Brown has stated the sustainable development goal as "to develop policies that will simultaneously protect our environment, promote economic growth, and provide millions of high-skill, high-wage jobs for American workers" (U.S. Department of Commerce, 1994, p. iii). Similarly, the United States President and Vice-President have stated the need for economic development to go hand-in-hand with environmental stewardship. The goal is the integration of economic and environmental objectives while achieving environmental justice—with "justice" meaning that the rich and poor of the United States should bear the costs and effects of environment degradation equally.

Most government sustainable development arrangements are new—the President's Council on Sustainable Development (Council) was formed in June, 1993. As a government/industry/academic community group assigned to development of a policy on sustainable development, its most recent update provides insight into United States

operational approaches related to sustainable development. To date, 66 goals and 267 subgoals have been presented to the Council by 7 policy-oriented task groups. The policy goals are associated with eco-efficiency, energy and transportation, natural resource management and protection, population and consumption, public linkages, dialogue, education, sustainable agriculture and sustainable communities.

On a priority rating, Goal 1 is "Economic Opportunity." This is defined as a growth rate of (at least 2.5%) per year. Together with Goal 2, "Jobs and Labor," it is expected to contribute to a high quality of life for individuals, families and communities. As the goals go on, with Goal 3 addressing "Consumption and Investment," such issues as the minimization of subsidies, reduction of deficits and expansion of private investments are stated. Toward the end of the list, geographic distribution of United States population, citizen participation in civic society, and individual's behavior have been associated with strategic goals. Vision statements abound within the Council and its working groups made up of industry, government, environmental, labor and civil rights organizations.

Our vision is of a life-sustaining earth. We are committed to the achievement of a dignified, peaceful, and equitable existence. We believe a sustainable United States will have a growing economy that equitably provides opportunities for satisfying livelihoods and a safe, healthy, high quality of life for current and future generations. Our nation will protect its environment, its natural resource base, and the functions and viability of natural systems on which all life depends (President's Council on Sustainable Development, March, 1995, p.7).

A phone conversation with the Department of Commerce Chief of External Affairs, Roan Conrad (May, 1995) provided some insight as to what may be expected at the government/policy level regarding sustainable development as a formal policy. According to Mr. Conrad, sustainable development is unlikely to find its way into policy this administration, the best that might be hoped for is the President's ongoing support of sustainable development task force groups. At the national level little is expected. The

community level is likely to see the majority of initiatives.

On being asked if he was aware that the United States had a National Environmental Policy within NEPA, his reply was that "he had not looked at NEPA in twenty years" but that at the close of our conversation he would look into it. The conversation continued on how NEPA could be used to "shore-up" sustainable development within national policy, by providing for expanded application of sustainable development goals within NEPA policy strategies. While this prospect had not been previously considered, Mr. Conrad noted that the concept would be addressed at the April meeting sponsored by the Council.

By early 1996 the Council had completed its national action strategy plan on policy changes needed to encourage sustainable development. The adoption of a "way of thinking" appears at the heart of the Council's final recommendations. The new thinking is described in the Council's March, 1996 report as a "conviction that economic, environmental and social equity issues are inextricably linked and must be considered together" (p. 2). Both individuals and institutions must take on greater responsibility, and embrace an ethic of environmental stewardship. The report goes on to highlight desired policy changes in education, improving information, innovation in management systems, strengthening communities and demonstrating leadership.

The prospect of using NEPA in either form or content as a cornerstone for sustainable development does not appear in the report. Interestingly enough, however, the remarks by President Clinton on the report, reflect many of the early Jeffersonian ideas of government and reinforce the need for citizens to "work together to tackle the challenges of a new century" (p. 1). Implementation is stressed as the next order of business for the Council.

The President's contribution to the Council is influenced by the CEQ whose main



activity under this administration has been their work with the Council. Of the nineteen CEQ staff, many are active on the Council.

While this research views policy as a key indicator of environmental directions and strategies, policy need not be limited to single issue agendas, and policy linkages are acknowledged as important. Thus sustainable development, although far from being a national policy in itself, has in the real-world penetrated most notably pollution prevention policy. Through this policy, sustainable development is a consideration in integrated ecosystems management, a prominent element of CEDM principles. "Sustainable use" appears as the objective in these new initiatives.

### **7.3.1 Sustainable Development Applied Internationally**

Outside the United States, sustainability has been successful in making its way onto international agendas and now has an international body charged with implementing the goals of the Rio Conference, The United Nations Commission on Sustainable Development (CSD) began organization meetings in early 1993. Global discussions on finances, the environment and social factors are surfacing on prominent institutions' agendas, for example, the World Bank (World Bank annual meeting September, 1993). Ecologists and economists are coming to the table to advise on movements toward sustainability (World Bank Panel). Movements have been made to initiate ecosystem assessments (U.N. Mediterranean Action Plan). In the United States, Vice President Gore is on record as supporting the CSD and individual country commitments to the agenda (Opening session of the CSD, 1993).

In the business community, MIT professor Choucri, speaking before an international law conference, calls for an activist stance on sustainability, and states that "business-as-usual" will prove a high risk for economic stability. Directives from a newly established Business Council for Sustainable Development advocate proactive strategies for all phases

of operations. From the business community a call has been put out for education, information sharing, and research.<sup>66</sup>

A significant international initiative on sustainability was initiated in early 1993 when the European Community program of policy and action in relation to the environment and sustainability was released (Resolution of the Council, 1993). The program covers the fundamental underlying issues and strategy objectives. The perspective on sustainability taken in the community is comprehensive, and where documents in the United States discuss a "new era," the European Community states that "The time has come for Community Environmental Policy to move into a new gear" (Resolution of the Council, 1993). The resolution, like the United States agenda references implementation of such a sustainable development strategy as requiring considerable change in almost all major policy areas.

### **7.3.2 CEDM and Sustainability**

Caldwell (1990) tells us that the intent behind both phrases—CEDM and Sustainability—is necessary to "guide the realization of human potential without detriment to the ecosystem" (p. ix). Yet, while both ideas are compatible and most scholars believe them to be necessary for the ecosystem survival, sustainable development remains at only the broadest conceptual stage. Certainly in the United States, what is to become political will rather than political rhetoric is yet to be determined. CEDM has the advantage of several decades of process and policy evolution, that can be garnered for application in the context of sustainability.

Sustainability, also has its own significant attributes and the researcher believes that its appearance on the government and social scene is timely, to act as a consciousness and

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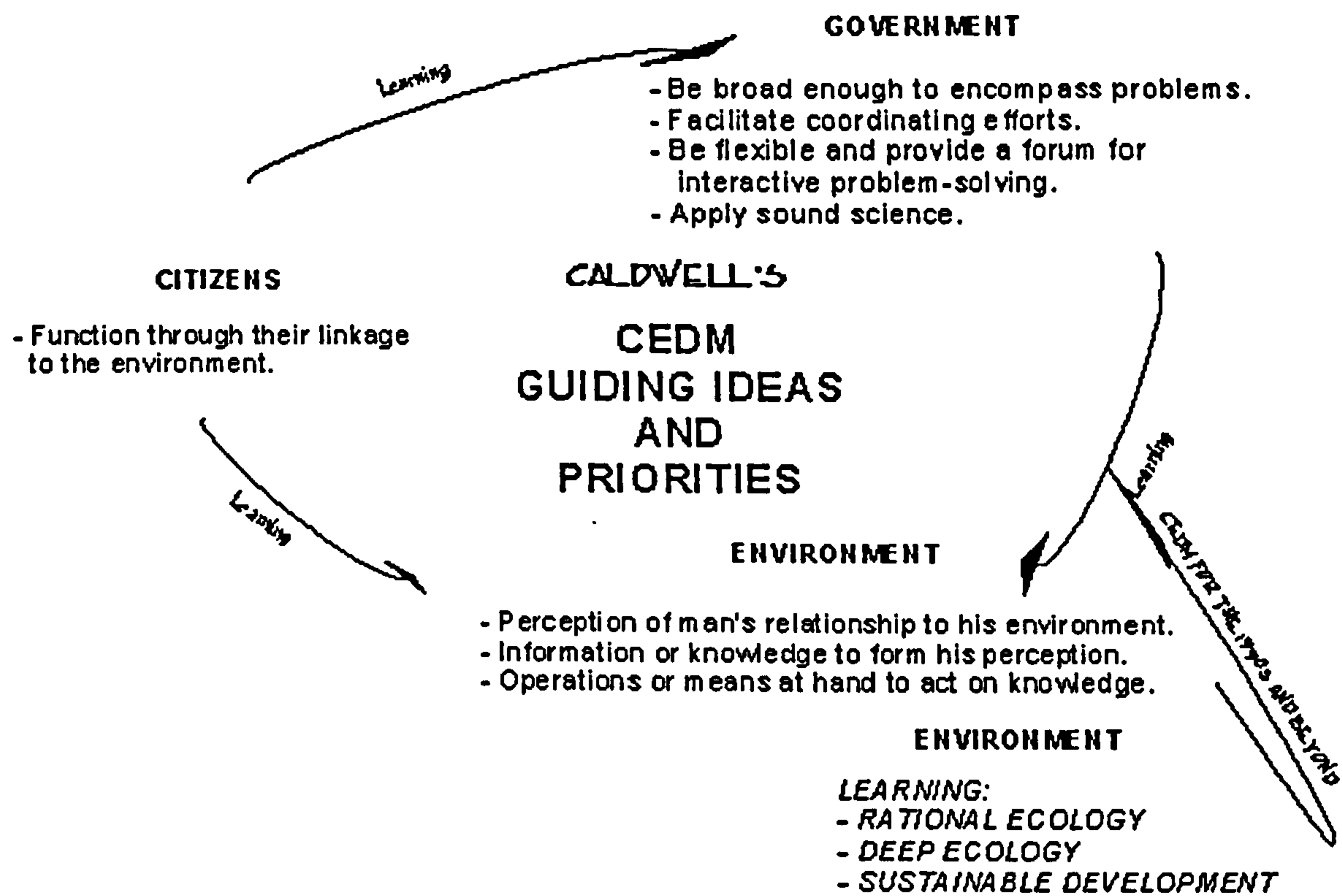
<sup>66</sup> These sustainable agenda activities were summarized from a review of the reports offered through the International Environmental Reporter, February 24, March 10, 24, and June 16, 1993 (Bureau of National Affairs, Washington D.C.)

goal raising exercise, much like Caldwell's call for CEDM in the 1990s. The Bruntland Commission and the Rio Convention, as well as the recent work of the President's Council have added legitimacy to the concept of sustainable development. In legitimizing the prospect they have made it easier for researchers to press the issue further. CEDM may act as a key initiating paradigm, as it becomes more understood and operational. Central to legitimacy is a comprehensive decision making framework and guidelines that reflect values, generalizations and beliefs about sustainable development.

The final goals of CEDM and sustainability both reflect environmentally-oriented general decision making, with the practical and theoretical limits intrinsically linked (Bartlett, 1990). If the goal and means of CEDM can be clarified, as this research suggests such that there is broad adoption of the CEDM paradigm supporting rational ecology it is irrelevant if it is known as CEDM or "operationalizing" sustainable development. The end result can be environmental quality and economic growth.

Clarification of the environmental idea contributes to CEDM learning basically through Caldwell's perception, information, and operational attributes contributed to man and his environment. Operationalizing CEDM through rational ecology provides the environmental attributes. Both deep ecology and sustainable ecology/development add underlying philosophical truths that "sustain" CEDM as it strives for operational means to achieve goals. Given acceptance of deep ecology and/or sustainable development, there still remains the question of the level of commitment and paradigm understanding that seek to achieve the goal. Figure 15 illustrates the environmental beliefs associated with CEDM.

**FIGURE 15 THE ENVIRONMENTAL CONTRIBUTION TO CEDM LEARNING**



## **Chapter 8: ACCEPTANCE OF A CEDM PARADIGM**

Steps to achieve the CEDM objectives require a reorientation of the priorities of the government and citizens established by Caldwell. The environment requires clarification and rational means to achieve economic growth and environmental quality. As an approach to solving problems, objective, rational and logical modes of thinking along with intuitive thinking are required by the professional in realizing the paradigm elements.

The CEDM paradigm reflects on Caldwell's earlier work where the role and responsibility of the "functional" citizen is critical to the effectiveness of democratic self-government. But the place of the citizen in the overall structure of the government has largely been neglected. This research describes the citizen as the environmental professional within industry or what Caldwell calls the "vast impersonal aggregations of power" and democratic government described by Caldwell as "the most difficult kind of social effort to undertake" and provides a paradigm not to dispute policy and dismantle power but rather to use learning about government-citizen-environment as a means to use the power and policy to the betterment of the man in the environment relationship (Caldwell *et al*, 1976, pp. xi and xxv).

As a central player in the policy network, the environmental professional can strive for the aspects of a "good" comprehensive environmental decision through:

Generalizations emphasizing that:

- Rational ethics and systems thinking provide guidelines for human conduct.
- Government policy, based on sound science, can impact morality.
- Citizens have a key role in decision-making.

Beliefs that:

- Values of an ecosystem is fundamentally based on rational ecology utility.

- The relationship of man and his environment, based on rational ecology, can be advanced by innovative and skillful use of NEPA and Pollution Prevention policies.

Values such as that:

- The environmental professional has an obligation not to do harm.

## 8.1 GENERALIZATIONS

Researchers can all agree that there is a great deal that is special about ecology. Linking ecology to economics in any attempt to characterize comprehensively the man and environment relationship must begin with critical core generalizations that the environmental professional can accept as objective reality—it is suggested that these generalizations comprise the principles that govern human growth and those that underlie CEDM.

This thesis argues for rational ethics and systems thinking as a guide to professional actions. Since not all professionals have the same experience and history, from which ethics are ultimately derived, ethics is given a minimal interpretation following the introduction of the "harm principle" in utility theory: if nothing else can be a guiding principle, an obligation ethic not to do harm is proposed as a basis for decision making.

An obligation not to do harm represents a fundamental shift in thinking, in that it requires a vision beyond self-interest. Systems thinking can then be used to determine how the ethical vision can be operationalized. Systems thinking builds on ethics to achieve a shift of mind through the disciplines of vision, mental mode development, team learning, and personal mastery. Through their effect on personal involvement and empowerment, these disciplines are the keys to environmental quality and economic growth. Systems thinking opens up the mode of consciousness in which we feel connected, that the environment is not something "over there," it gives oneness or holism to the man-environment relationship, i.e. man in the environment not man and the environment.

The second and third generalizations build from the observation that government action has a high obligation profile in the United States in its ability to impact moral decisions. Obligation is the "moral concept" in policy. The United States pollution prevention agenda is grounded in sound science and is moving towards advocating the utility of a system based on rational ecology values. Reinforced with requirements for public participation, advocating the rational ecology criteria for any social choice system could become a generally accepted requirement of good government administration.

The inclusion of this formal administrative element thus rejects the idea that government has no place in the moral development of its citizenry. This research is in agreement with Caldwell, that the government through its ability to develop policy and uphold administrative structures also has a formal obligation in a social democracy to uphold the no harm principle. Acceptance of this broader responsibility will require an evolving change in government, a change which can be promoted by the actions of the environmental professional.

The participation of citizens in decision-making has been emphasized by drawing attention to the relevance of the functional citizen. While the government structure is seen to support general public participation, this research emphasizes the environmental professional as a leader in participating action. Through professional and personal interactions, human capital is realized individually and carries the creative capability to build additional capital, as occurs economically in the business environment.

## **8.2 COMMITMENT TO BELIEFS**

The CEDM guidance model accepts a social choice mechanism that is modeled on rational ecology guidelines and assessment criteria. Rational ecology utility theory provides the value goal and means for developing the guidance model. The utility of an ecosystem

beyond self-interest builds from current utilitarian theory. The utility embodies the minimal utilitarian man and environment relationship and this restricts the paradigm to only the most basic human interests. However, it applies to the well-being of the system as a whole and is sufficiently broad so that all environmental professionals could rationally agree on the goal.

The criteria may require further refinement, but the productive, protective, and waste assimilative attributes of the ecosystem, as life supporting factors, is a place to start in the refining of CEDM understanding. While this may seem oversimplified in a world where utility ideas have expanded to complex formulations such as those employed in multi-attribute decision analysis, it is not the case. From a researcher/professional position, a means to understand comes first. Agreement on the utility goal and means to meet that goal provide the fundamentals that must be accepted by the broader community. Following their acceptance, decision analysis tools are used to inform decisions aimed at achieving that goal.

Within the United States, tools that can be applied by the environmental professional community are the strategies of NEPA and Pollution Prevention. At the disposal of the professional, these policy strategies can be deployed in the service of a commitment to rational ecology principles. EIA methods which have the objectives of environmental and community sustainability<sup>67</sup> can also be deployed.

Acting according to the paradigm, the environmental professional must deal with the world as-it-is. Therefore, the paradigm is effective when it allows the professional to deal with the variety of factors, conditions and constraints of the workplace. It must be encompassing yet flexible allowing the professional maximum freedom to act while not deviating from the core rational ecology beliefs. Models and applications are expected to

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<sup>67</sup> Sustainable development is facilitating a current exchange of views and information on evolving approaches that as a whole are built on economic, social and environmental policies and plans (United Nations Conference, 1992).



change, whereas core beliefs are expected to be persistent.

### 8.3 SHARED VALUES

The third component of the paradigm provides the core values underlying the generalizations and beliefs. While these values provide the sense of community and inform functionality at all times, they are particularly important when incompatible ways of practicing present themselves. This research proposes an obligation ethic as the basic core on which individuals can agree to provide a sense of community to environmental professionals. Obligation is proposed as the central value tenet and can emerge when professionals consider and judge their actions.

The obligation ethic and assessment criteria can properly follow a basic survival instinct and lay down the qualities demanded, the modes of behavior, and the values attached to man and environment relationships. Such values can be shared although their application may vary from one member of a community to another (Kuhn, 1970). Based on obligation the environmental professional is encouraged to make his own decisions in the operations of CEDM.

The effectiveness of CEDM will be enhanced first by providing definition of an abstract idea. This will permit criteria and guidelines to be more readily defined and applied. One key point is that the rational ecology guidelines and criteria could be a model for CEDM. Central to this are criteria to evaluate the effectiveness of a social choice mechanism, such as policy strategies which provide for negative feedback, coordination, robustness and resilience; and the value of the environment reflected in production, protection and waste assimilation.

The environmental professional who adopts the CEDM paradigm would possess the generalizations, beliefs and values described above. Through these characteristics the ethics

that underlie the paradigm will become manifested in day-to-day activities as the professional progresses through the stages of the learning disciplines.

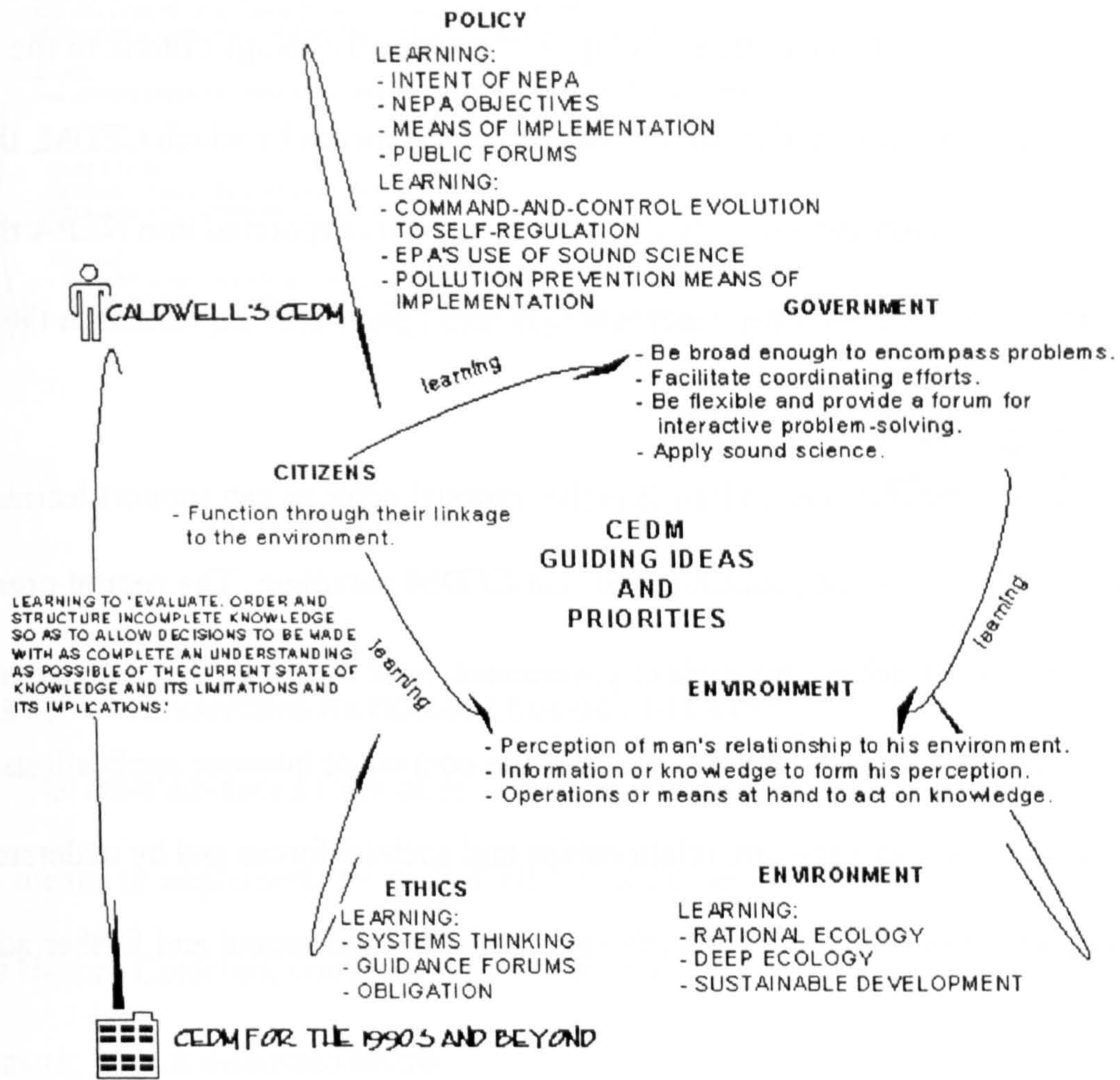
## PART C

### TESTING THE FINDINGS

Characterizing CEDM in the context of an emergent and adaptive learning process provides a helpful conceptual framework that is examined further in three case studies. The first of the three cases is presented in Chapter 9 and demonstrates the application of rational ecology to NEPA and Pollution Prevention policy as a means of bringing our understanding of the biophysical environment and our role in it in line with our capacity to alter it irreversibly as called for by Caldwell in 1964. This chapter analyzes the environment through levels of perception, information and knowledge, and operations developed around rational ecology criteria in an attempt to find solutions that the environmental professional can utilize. The second and third cases, discussed in Chapter 10, reflect the integration of CEDM within an innovative infrastructure currently evolving within business interests and government agencies worldwide. The second case addresses a workplace activity in Britain where the researcher/environmental professional sought to integrate CEDM elements through a Strategic Business Plan. The third case uses the understanding gained in the second case and incorporates a learning evolution period between CEDM introduction, and its applications, and seeks an integration of CEDM into training for, and design and development of, an environmental management system in the United States.

Presented as a continuing process, Figure 16 illustrates the contribution to CEDM learning advanced. The interrelationships of the issues will be further studied in the development of three case studies.

FIGURE 16 ADVANCING CEDM PARADIGM BASIC PRIORITIES



**CEDM PARADIGM ELEMENTS**

- RATIONAL ETHICS AND SYSTEMS THINKING CAN PROVIDE GUIDELINES FOR HUMAN CONDUCT.
- GOVERNMENT POLICY, BASED ON SOUND SCIENCE, CAN IMPACT MORALITY.
- CITIZENS HAVE A KEY ROLE IN DECISION-MAKING.
- VALUES OF AN ECOSYSTEM ARE FUNDAMENTALLY BASED ON RATIONAL ECOLOGY UTILITY.
- THE RELATIONSHIP OF MAN TO HIS ENVIRONMENT, BASED ON RATIONAL ECOLOGY, CAN BE ADVANCED BY INNOVATIVE AND SKILLFUL USE OF NEPA AND POLLUTION PREVENTION POLICIES.
- THE ENVIRONMENTAL PROFESSIONAL HAS AN OBLIGATION NOT TO DO HARM.

## **Chapter 9: RATIONAL ECOLOGY CRITERIA APPLIED TO NEPA AND POLLUTION PREVENTION**

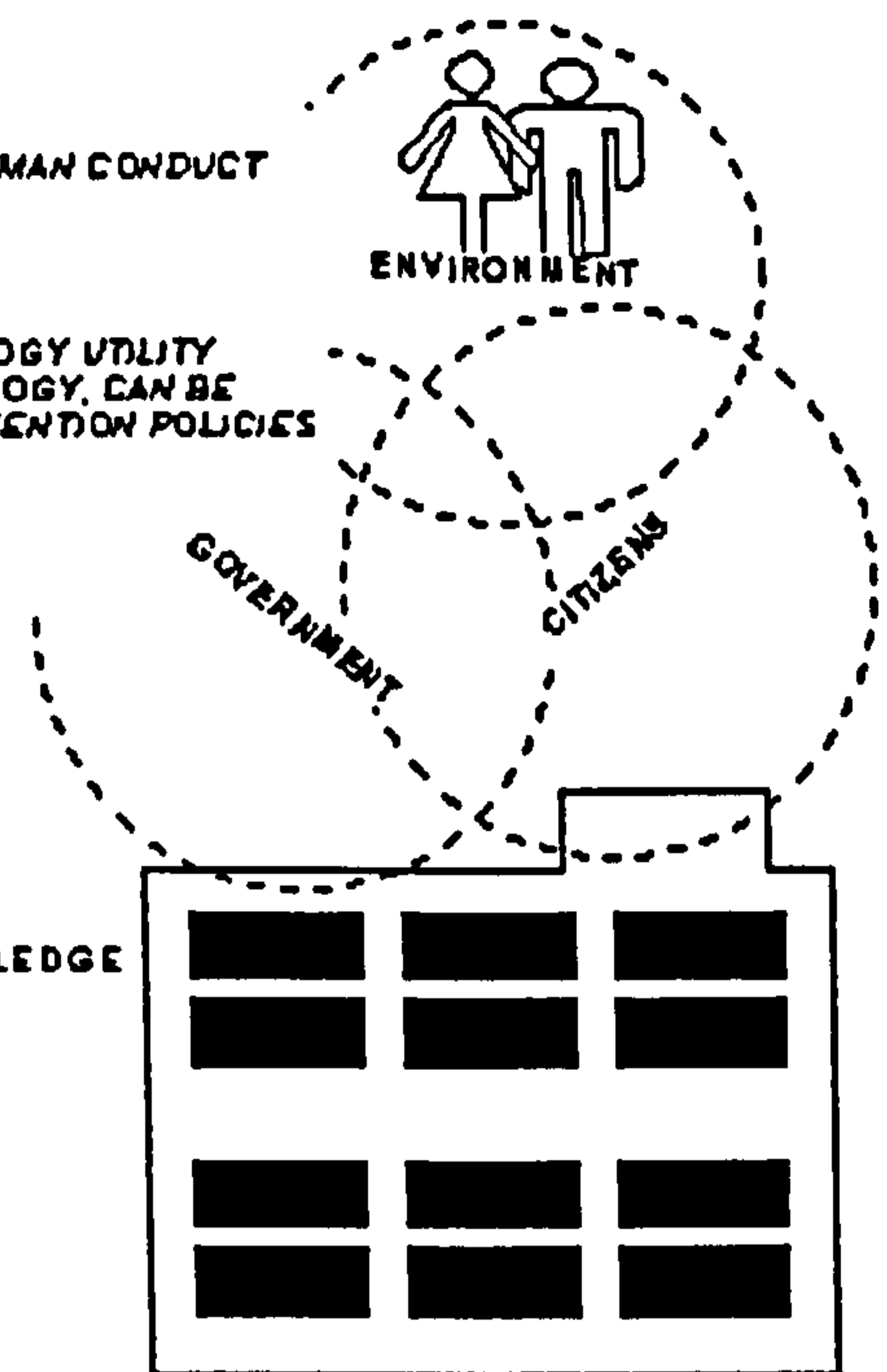
The challenge at this juncture is to apply the rational ecology criteria to the NEPA innovative policy mechanisms. Further exploration of the means by which CEDM, through follow-on policy evolution and new policy development, is incorporated into NEPA through pollution prevention strategies. Legitimacy is sought and operational expression in the 1990s and beyond is described in this Chapter.

The hypothesis advanced in Part B is that rational ecology can support learning and clarify theory and operational procedures for the CEDM paradigm. The central premise is that different policies, which are the tools of government, have their own distinctive dynamics that affect the content of government action and the context of business applications. Each instrument carries its own baggage, relationships and societal forces and by understanding and working with these dynamics professionals can better understand and further advance CEDM.

Rational ecology is called on to provide the guidelines and criteria for the implementation of such a policy process. Rational ecology provides specific guidelines that can be used to advance the debate on government-citizen-environment structural relationships identified by Caldwell as basic priorities for CEDM. Figure 17 illustrates the directions of the first case study.

**CEDM PARADIGM  
ELEMENTS**

- GENERALIZATIONS:**
- RATIONAL ETHICS AND SYSTEMS THINKING CAN PROVIDE GUIDELINES FOR HUMAN CONDUCT
  - GOVERNMENT POLICY, BASED ON SOUND SCIENCE, CAN IMPACT MORALITY
  - CITIZENS HAVE A KEY ROLE IN DECISION MAKING
- BELIEFS:**
- VALUES OF AN ECOSYSTEM ARE FUNDAMENTALLY BASED ON RATIONAL ECOLOGY UTILITY
  - THE RELATIONSHIP OF MAN TO HIS ENVIRONMENT, BASED ON RATIONAL ECOLOGY, CAN BE ADVANCED BY INNOVATIVE AND SKILLFUL USE OF NEPA AND POLLUTION PREVENTION POLICIES
- VALUES:**
- THE ENVIRONMENTAL PROFESSIONAL HAS AN OBLIGATION NOT TO DO HARM
- CASE STUDY:**
- RATIONAL ECOLOGY CRITERIA APPLIED TO NEPA AND POLLUTION PREVENTION
- FOCUS:**
- INTENT AND MEANS OF IMPLEMENTATION OF NEPA AND POLLUTION PREVENTION, AND
  - PERCEPTION, INFORMATION, AND OPERATIONS TO ACT ON KNOWLEDGE



**FIGURE 17      ADVANCING RATIONAL ECOLOGY IN CEDM**

The most advanced form of environmental impact strategy, that has been proposed as the means to implement the multiplicity of advanced EIS concepts put forward at the United Nations Conference on Environment and Development (1992), provides a theoretical benchmark. This is discussed below.

**9.1                      LIFE CYCLE POLICY CONSTRUCT**

As policy evolves into the next century, so too will a mode of policy implementation that takes into account what the EPA describes as a "new environmental ethic." The "interrelated whole," the same ecological understanding called for in NEPA will come more to the forefront of EPA's policy directions. The section addresses the opportunities for realizing this ethic in the next policy era.

By 1991, Reilly had claimed a "mode of behavior" transformation at EPA (government) as to how to understand and pursue (their) Agency's mission (Pollution Prevention News, October, 1991). The research findings in Part B represent an investigation of this statement and confirm that the behavior of the agency in the mid 1980's and today

shows that a transformation is happening. Industry's "mode of behavior" has also changed, but the full impact of pollution prevention initiatives is just beginning to be felt through public reporting, economics, enforcement initiatives, and management strategies. The public is the central factor, seen by the government as instigating change. A "mode of behavior" change instigated through NEPA on operations is only just beginning. All such transformations are difficult to measure, but nonetheless it is meaningful to record the qualitative change of direction. As with NEPA, the operational content of the EPA strategy is in line with the directions proposed for more general application herein, i.e. pollution prevention fosters a mode of behavior that seeks to

extend to people in industry, at every level of government, environmental and public interest groups, and each of us as consumers and members of the general public (Pollution Prevention News, May, 1989).

Ecological approaches are demanding more from the EIA process and pollution prevention can bring requirements for an improved process into sharper focus. Balancing competing demands (Section 101 of NEPA) within an environment where the human species' thirst for resources and ability to pollute exceed each prior year's projections, there is little alternative but to try to balance the demands through life-cycle approaches and social choice mechanisms that are underpinned by an obligation ethic.

## **9.2 "ENVIRONMENTALLY PREFERABLE"**

The final Record of Decision (ROD) of the EIS process uses "environmentally preferable" as the central comprehensive decision making goal. To arrive at the final ROD the process and the documents supporting the decision include: laws, regulations and prior EISs/EAs; computer runs; references; maps; agency records; draft EIS/EA materials; agency and public comments. These analysis file documents are all used to develop the materials essential to the EIS/EA whereby the ROD is determined. The environmentally preferable

alternative, in theory, is that alternative that best satisfies Section 101 of NEPA. This section of the law does not mandate that no impacts will occur, but it does indicate that the agency should carefully consider and balance the various impacts of the various alternative actions.

The "balancing" comes into play when selecting the environmentally preferable alternative that will promote the National Environmental Policy as expressed in NEPA's Section 101. The CEQ (1981) interprets the Section to mean the "alternative that causes the least damage to the biological and physical environment, it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources. Alternatives are thus evaluated by their environmental consequences. The CEQ (1981) has also called on "environmentally preferable" as a decision making guideline to fulfill the responsibilities of each generation as trustee of the environment

A comprehensive impact process can extend far beyond the criteria supported by the CEQ, which in itself is extensive covering any project activity that may impact public health and safety, cultural resources, historic places, wetlands or flood plains, or any other resource. The project activity is acceptable if it affects these resources in such a way that:

- it is not controversial;
- all effects are known and all risks understood;
- it establishes no precedents for future actions; and
- the cumulative effects are not significant (NEPA Section 1508.4).

With such a scope of actions potentially falling under the Federal impact assessment process, as well as expanding the scope under the state process, it is not surprising that an environmental impact process can be used as an overall planning document for a community system as well as an industry management system, capturing almost all policy, programs and activities within its program implementation domain.



How the symbiotic relationship between communities and the environment is currently expressed in the NEPA/CEQA process can be illustrated through a review of several case studies. The communities represent arbitrarily bounded ecosystems, as allowed for by Dryzek (1987). The case studies of these communities demonstrates that bottom up and top down planning can cumulatively cover a broad integrated scope.<sup>68</sup>

### 9.2.1 Case Studies in CEQA

To see where "environmentally preferable" is today, some community blueprints allowing for and ultimately determining "environmentally preferable" within the context of the National Environmental Policy and/or California Environmental Quality Act, which can ultimately effect community development in a comprehensive manner, are reviewed. Seven cases where the California EIR and/or EIR/EIS process has been utilized are discussed in this section.

Case 1:                   The California Desert Conservation Area <sup>69</sup>  
Lead Agency:           U. S. Department of the Interior  
Date:                    Final Draft: 1980  
Public Comments:      18,000 citizens participated in the EIS process. 9,000+  
                                  provided written comments

The proposed action was a long-range, comprehensive plan to manage the public land uses and resources of the 25-million-acre California Desert Conservation Area (CDCA). The area is characterized by over 100 subcommunities, ranging from one-person mining

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<sup>68</sup> The community has been previously advanced as the 'blueprint' for ecological design most notably by Schumacher's (1973) Small is Beautiful and remains a decentralization focus for ecological strategists today.

<sup>69</sup> Source: United States Department of the Interior, Bureau of Land Management; Bureau of Land Management California State Office, State Director, Sacramento California. "The California Desert Conservation Area Final Environmental Impact Statement and Proposed Plan," September, 1980.

settlements to resorts, military bases and power generating plants. 15,000 miles of paved roads connect the area. Agricultural acreage also makes up a significant part of the area. The criteria for land use were those given in the Federal Land Policy and Management Act of 1976, which established the CDCA. The Act also provided for the development of a comprehensive plan for the management, use, development and protection of the lands based on multiple use, sustained yield, and maintenance of environmental quality.

To accomplish these objectives the impact action was primarily designed around a process that investigated four multi-use classes which directly and indirectly control uses and support resources on a desert-wide basis. A summary of the alternatives provides valuable insight into values and criteria used in the impact process.

1. **Protection Alternative.** Management actions in this case are directed toward providing the strongest preservation and protection of natural and cultural values allowed within a multi-use framework. The multi-use framework was predetermined to be: area designated as wilderness and area in multi-use categories in which consumptive uses were given equal or favorable consideration in a tradeoff decision making process.
2. **Use Alternative.** Actions in this case maximize production values and consumptive uses of desert resources, while complying with legally mandated environmental protection standards. This action provides the widest latitude for use associated with: motorized vehicle access, livestock grazing, mineral exploration and development, energy production, development, and transmission; within a multi-use and sustained yield framework.
3. **Balanced Alternative.** Provides for a variety of uses in a sustained yield framework. Conflicts and tradeoffs between uses considered the constraint of protecting the

fragile resources from irreversible decline. Approximately 50% of the land is in a protective-oriented multiple-use class and the remainder in a use-oriented class.

4. **No Action Alternative.** Because the present management of the land is not in accordance with the Act's criteria, this alternative is not viable, but is considered the benchmark by which to measure the other alternatives. The lands are not currently managed under any comprehensive plan, the area is in severe degradation and there is a continuing decline in ecological, biological and scenic resources.

Based on the public comments received on these alternatives, the proposed option offers a 20 year management plan that controls and directs the type and degree of land use and resource management activities according to resource sensitivity and public demand. The plan was developed from the resolution of conflict identified during the extensive public involvement process. In the procedural process, conflicts were analyzed by the use of an ecosystem-based analysis.

The symbiotic relationship in this case uses the value characteristics of resource sensitivity and public demand. The utility of the ecosystem represents an arbitrary combination between social and natural systems.

**Case 2:** Shasta-Trinity National Forests Land and Resource Draft  
Management Plan<sup>70</sup>

**Lead Agency:** United States Department of Agriculture—Forest Service

**Date:** Comment Period: 1994

**Public Comments:** Pending

The ecological community in this case is the 2.1 million acre Shasta-Trinity National

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<sup>70</sup> Source: United States Department of Agriculture, Forest Service; Pacific Southwest Region, San Francisco, California. "Draft Environmental Impact Statement: Shasta-Trinity National Forests Land and Resource Management Plan."

Forests. The management plan, when agreed upon, will guide management of the Forests for the next 10 to 15 years. The possible management programs considered revolve around four alternatives:

1. Balanced combination of commodity and amenity production;
2. Commodity emphasis;
3. Continuation of present management direction with no change in the level of outputs or activities; and,
4. Development in conjunction with the Citizens for Better Forestry, which represents a balance between resource use and restoration.

Based on early scoping, the Forest Service chose the "balanced combination of commodity and amenity production" as the preferred alternative. The public comment period at the close of the draft period will provide the agency the opportunity to analyze and respond to the comments.

The symbiotic relationship in this case uses a value characteristic based on the ability of the ecosystem to produce and (it is assumed sustain) natural resources and recreation amenities. The standard by which this production capacity is to be judged is not well defined.

Case 3: University of California, Davis Draft Long Range Development Plan<sup>71</sup>

Lead Agency: California Department of the Environment

Date: 1989

Public Comments: Copies not available

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<sup>71</sup> Source: University of California, Davis, Davis California and Wallace Roberts & Todd, San Francisco, California. "Draft Environmental Impact Report: University of California, Davis Long Range Development Plan," April, 1989.

Development plans (in California) require an EIR. The University was required to submit an EIR evaluating its intended expansion plans for the campus. In the EIR the University considered six alternatives:

1. No Project, No Development
2. No Project, Limited Growth
3. Lower Enrollment Growth
4. Higher Enrollment Growth
5. Alternative Site (intended project was a development of agricultural land)
6. Off-Site Alternative

In evaluating the alternatives factors considered included: geo-technical aspects, hydrology and water quality, biological resources, land use, cultural resources, visual quality, population and employment, housing, traffic circulation and parking, air quality, noise, hazardous substances, utilities and services, water supply, wastewater, police protection, fire protection, solid waste management, energy, schools, parks and recreation. CEQA required these issues to be addressed within a cumulative framework, with growth inducing impacts considered as they related to local short-term and long-term uses.

The solid waste management mitigation measures included resource recovery and recycling incorporated into designs, and research and development was to be conducted to integrate waste into compost. Energy conservation required thermal insulation, energy efficient refrigerators, passive solar features and time controlled lighting. Hazardous waste minimization programs were to be implemented with emphasis on recycling and source reduction.<sup>72</sup>

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<sup>72</sup> The impact process at Davis represents a key state-of-the-art guide to the application of a process using ecological criteria associated with rational ecology where waste assimilation is clearly included in the process. Productive and protective considerations as applicable to a municipality are also included.

The symbiotic relationship in this case uses a value characteristic based on the ecosystem's ability to integrate the impact of the development through an anthropocentric life-support approach in a cumulative framework. Rational ecology ecosystem values, within the narrow confines of the studies presented are best illustrated in this case, because of the use of NEPA/CEQA and pollution prevention policy integration.

Case 4: Land Use and Circulation Element of the Solano County General Plan<sup>73</sup>

Lead Agency: Solano County Planning Department

Date: 1980

Public Comment: Copies not available

In this case an EIR was required for an element of the General Plan for Solano County. The purpose of the impact process was to inform decision makers and the general public of the potential environmental consequences of implementing policies recommended in the General Plan. This plan is oriented toward preserving natural and agricultural resources in their existing productive state through appropriate land use designations.

The impact report consists of goals, policies and the designation of agricultural, open space, residential, commercial, industrial, transportation, public facility and service land use in the County. Because an EIR on a policy does not require the "degree of specificity" required in a project EIR (Section 15147 of CEQA), the intent is to highlight the possible secondary impacts that can be expected to follow the policy's adoption.

The particular plan and policy in question had significant negative impacts on social and economic factors, natural features and public facilities and services. Until the impacts can

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<sup>73</sup> Source: Solano County Planning Department. "Final Environmental Impact Report for the Land Use and Circulation Element, A Part of the Solano County General Plan," September, 1980.

be either mitigated and/or the policy/plan modified, the policy/plan cannot be adopted.

This activity served to point out the problems associated with the development of plans prior to adoption of appropriate values for ecosystem characteristics. Pointing out the relevance of man as the problem-solver, this case illustrates the difficulties in achieving symbiotic behavior where the necessary policy mechanisms are not in place.

Case 5: Draft Source Reduction and Recycling Elements and Household Hazardous Waste Elements<sup>74</sup>

Lead Agency: California Department of the Environment

Date: 1991

Public Comments: Copies not available

California Assembly Bill (AB) 939 establishes a goal to reduce solid waste directed to landfills by 25% in 1995 and 50% by 2000. Companion bill AB2707 required a plan for disposal of household hazardous waste. To reach these goals an EIR was required on the draft plans. The EIR addresses the environmental impacts of each jurisdiction (seven incorporated cities) individually implementing their plans, as well as the cumulative impacts of implementing the plans throughout Solano County.

This case represents an extensive integrated EIR process in the context of policies and projected developments following from the action components of Legislative Bills AB 939 and AB 2707, as integrated within Solano's County Integrated Waste Management Plan. Following this integrated impact assessment process, when individual activities within the overall Bills are proposed, i.e. a specific composting facility for example, the jurisdiction is required to examine these individual activities to determine whether their effects were fully

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<sup>74</sup> Source: LSA Associates, Inc. Pt. Richmond, California. "Draft Environmental Impact Report AB 939: Source Reduction and Recycling Elements and Household Hazardous Waste Elements," July, 1991.

analyzed in the EIR. As site-specific information becomes available a Siting Plan and EIR must be prepared. Project level CEQA analysis may be required for additional components and sub-components of the Bill.

In this case, the EIR process follows the legislative policy to community policy and to development projects intended to conform with policy. The primary purpose is to serve as an objective information document to be used by lead and responsible agencies, and the public in their consideration of the policies and projects.

Following one element of rational ecology ecosystem values—waste assimilation, this case looks for low entropy characteristics in order to combine human and artificially manipulated natural systems. In this case ecological engineering informed by policy and design is intended to deal with a micro level of a symbiotic relationship.

Case 6: Salinas Valley Seawater Intrusion Program Monterey County<sup>75</sup>

Lead Agency: Monterey County Water Resources Agency, Monterey  
Regional Water Pollution Control Agency, United States  
Department of the Interior

Date: 1992 (EIR), 1993 (EIS)

Public Comments: Copies not available

The proposed action was the reduction of seawater intrusion into the Castroville/Marina/Fort Ord area of the Salinas Valley by more than 50% and provide a long-term water supply to meet water demands for municipal and agricultural interests. The overall project includes capping ground water wells, drilling new wells and diverting Salinas River flows and reclaiming wastewater.

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<sup>75</sup> Source: Jones and Stokes Associates, Inc., Sacramento, California (Associated assistance provided by CH2M Hill and Boyle Engineering. "Environmental Impact Report/Environmental Impact Statement: Salinas Valley Seawater Intrusion Program Monterey County."



The EIS process was used to analyze alternatives associated with no reclaimed wastewater, with and without extraction barriers, and with various water supplies. In addition, the alternative of no-project was also analyzed.

This case follows similar regional EISs associated with water management planning in the state of California, where water is considered the limiting factor to community development. Prior to the impact process, development surpassed long-term water supplies.

To counter the problems raised by undifferentiated growth, extensive ecosystem planning is now taking place. In areas where water supplies cannot support growth, development permission/permitting can be denied.

The symbiotic relationship associated with this case again shows a micro level attempt at coping with natural systems seen as multi-media problems. In this case to restore an over-exploited system substantial environmental engineering was considered a legitimate option.

Case 7: Environmental Impact report on Collection, Treatment, Disposal Facilities Master Plan <sup>76</sup>

Lead Agency: County Sanitation Districts of Orange County

Date: 1991

Public Comment: Copies not available

In this case, the EIR presents the environmental analysis as required by CEQA on the Sanitation District's collection, treatment and disposal facilities 30 year Master Plan. Cross-media impacts (over 20-30 years) associated with implementation of alternative levels of treatment and methods of residuals disposal to serve the needs of a 450-square-mile service area with an expected population of 2.8 million residents by 2020 were reviewed as a part

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<sup>76</sup> Source: Jones and Stokes Associates, Inc. (Part 1) and Willdan Associates (Part 2), Sacramento, California. "Draft Program Environmental Impact Report on Collection, Treatment, and Disposal Facilities Master Plan," March, 1989.

of the plan approval. The EIR was used as part of the decision making process to support an application for a new National Pollution Discharge Elimination System permit for ocean discharge.

The EIR process criterion, related to the regulatory agenda, was to assess the Master Plan in accordance with the Sanitation District's policy of meeting the challenges of the growth projected by local and regional land use planning agencies through an action plan that will:

- protect public health and the marine environment off Orange County's coastline;
- provide sound, total environmental management, including weighing all alternatives and tradeoffs;
- continue scientific research; prepare long-range facilities' Master Plans;
- continue compliance with regulations;
- coordinate with other responsible agencies; and,
- provide appropriate public notification and input prior to final program selection by the Sanitation District's Board of Directors.

To accomplish this, the District, within the Master Plan, has proposed to expand their wastewater collection, treatment and disposal facilities to accommodate future increases in sewage flows. This will include the construction of sewers, construction of additional treatment facilities, expansion of wastewater reclamation by construction of satellite treatment sites, expanded monitoring and source control programs and expansion of the sludge management and reuse programs.

The alternatives to the development scenario includes a no-project that involves no new construction and would result in permit violations to ocean discharge, and various alternative construction scenarios. Refurbishment of the existing facility would not be

considered an aspect of "no new construction."

The environmental topic areas of the EIR were determined to:

- provide an environmentally sound regional sewerage system that minimizes risks to public health and safety;
- protect beneficial uses of water, land and air from impairment;
- comply with Federal and state regulatory standards;
- encourage wastewater flow reduction through conservation and reuse;
- reclaim wastewater for beneficial reuse and encourage development of markets for reclaimed wastewater; and,
- encourage beneficial reuse of sludge.

The alternative best suited to minimize impact and provide for growth was allowed "unavoidable" impacts. While many of the impacts would be considered temporary, i.e. construction hazards, etc., several impacts—shortened landfill life due to sludge disposal, secondary impacts of growth accommodated by facilities, exposure of facilities to risk of seismic action—were accepted with no further discussion.

As a concluding example, this case exemplifies the challenge facing symbiotic relationship goals where man and the environment are considered in the context of an artificial man-oriented and man-created agenda to seek ecosystem stability. What the ecosystem can support in terms of production in line with protective values and waste assimilation must logically be integrated into design. In this case, "environmentally preferable" was constrained by a perceived need to accommodate growth and therefore to see impacts of growth accommodated by the facility construction as unavoidable. A value system that accepts adverse impacts as unavoidable does little to support the optimum policy goals of CEQA, nor is it compatible with sustainability.

In this same case, using the rational ecological criteria, "unavoidable" issues must be addressed. The sludge, for example, must be accommodated within the system boundaries and the impact of the growth must be related to the overall productive, protective and waste assimilative capacity of the community. Thus the potential for shortened landfill life would be addressed by invoking alternative forms of sludge treatment linked to energy, agriculture and land reclamation. The impact on growth, seen as unavoidable, reflects a key problem being realized all over California. Undifferentiated growth, where economic well-being and environmental characteristics are not equally considered, is considered by many as the final limiting factor.

In relation to a Master Plan approach, instead of addressing all the significant environmental utilities in an open forum, the plan initially designated the criteria by which the EIR was to be evaluated, as well as what impacts were unavoidable, i.e. those that had to be incurred to accommodate growth projections. Little or no emphasis was placed on the growth issues relative to rational planning for the ecosystem (as defined through the boundaries of the district). If the EIR were linked to an overall environmental impact umbrella policy for the area, the permit criteria/requirements for ocean discharge would indicate a different picture of how significant environmental effects were noted and further examined.

Although California has allowed such broad planning documents, they are open to challenge. From a cursory view it appears that citizens could have challenged the basis of the analysis presented and brought the decision more in line with the CEQA guidelines—which do not say growth at any cost.

Case 7 shows that although the Master Plan talks about integration, when undifferentiated growth is challenged the old system of linear thinking is resumed. At some

point, the county will undoubtedly be faced with a growth limiting factor.<sup>77</sup> This was the issue in Case 6, where water demands outstripped supply, and after-the-fact environmental impact processes are trying to bring an ecosystem back into operating range.

### 9.2.2 Case Findings for Symbiotic Relationship

These cases not only represent diversified and evolving applications of the environmental impact strategy as a process but also point to the diversity of environmentally preferable ecosystem applications. In all cases, with the adoption of a formal value (utility) system centered on production, protection and waste assimilation, alternatives could have a common judgment value. If this were the case, there would be a better articulation of what "fulfilling responsibilities" called for by NEPA/CEQA would actually mean, and "environmentally preferable" would provide clear criteria guidelines.

To try to avoid the Case 6 scenario, where a limiting factor jeopardized the ecosystem, Case 5 shows a preplanning, integrated process. While the issue was specific to hazardous waste, it was dealt with in an integrated fashion beginning with State policy and community policy linkages. In this way, policy should align with a comprehensive picture of the issue from a broad ecosystem approach—at least for this one factor. The same scenario could have applied to water development, use and conservation in line with economic development.

All of this is in sharp contrast to Case 3, where Davis (known for its active citizen involvement) has a differentiated growth agenda, and the EIR reflects this broader scope. "Unavoidable" associated with a yes on growth, with no accommodation for that growth would not have been acceptable within the Davis plan. The University plan had to take

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<sup>77</sup> From the researchers knowledge of the area, transportation is considered the limiting factor that most prohibits growth/development. This factor is linked to the public's unwillingness to pay for transportation development.

account of the growth issue within an ecosystem framework, that would not be out-of-line with a rational ecology utility.<sup>78</sup>

"Environmentally preferable" in Cases 1 and 2 shows attributes more in line with multi-use, with use directed by the resource's ability to accommodate a particular type of public demand or utility. The difference between the forest ecosystem and business operations oriented cases shows the significance of long-term dominance of NEPA principles in the environment, and specifically in relation to wilderness/forests. NEPA concepts are adopted where the management links resource capability to public use demands. In an industry/operations setting, historical "control" linear mentality kick in where the linkage is limited to, for example, water treatment residuals. While law provides for NEPA/CEQA concepts to take hold in an industrial/operations setting, the transition of perception is obviously not complete, and selective application is common.<sup>79</sup>

"Environmentally preferable" can move more in line with ecological rational assumptions, where, as Cases 3, 4, 5, and 6 show, the linkage of the EIS/EIR is made to a larger community plan within which alternatives can have a rational ecological utility assigned to them. In such cases industrial/operations are linked through economic and ecological interests, with core policy subject to the process. "More in line" cannot, unfortunately, be considered rational ecology, but these cases do indicate an evolution toward a fuller appreciation of NEPA concepts and how an appropriate life-cycle policy orientation of an area, development, or process could prove useful.

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<sup>78</sup> It is interesting to note that environmental policy research and planning is an important element at the University of California at Davis, where such scholars as Sabatier reside.

<sup>79</sup> CEQA provides for "negative declaration" which, if approved, confirms the project would have no significant impact on the environment, i.e. no EIR would be required. These declarations are subject to review and public comment.

Pollution prevention can extend a life-cycle approach toward a rational environmental risk reduction (its primary "official" emphasis) process and begin to address the integrative productive, protective and waste assimilative capacity of an ecosystem where man is part of nature.

This can best be exemplified and further linked to the last CEQA case study by examining the associated pollution prevention strategies. The Sanitation District's EIR provides information for the various collection facilities components—inceptor sewers, for example, are part of the Master Plan. Industry, while clearly regulated to not have off-site discharge, has accidents, spills and or non-compliance occurrences which can adversely affect the District's actions. As an example, a paint manufacturer would be required to have various media operating permits<sup>80</sup> thus triggering an EIR. The manufacturing and use of paints containing toxic solvents can contribute to any or all of the following traditional environmental problems as categorized in regulation: criteria air pollutants; toxic air pollutants; indoor air pollution; non-point source pollution; pollution of estuaries and coastal waters, hazardous waste; and municipal waste.

These problems can be approached one at a time, but a far more desirable pollution prevention approach—which would reduce all of the problems noted above—would be to reformulate the paint so it contains less or no toxic solvent (EPA SAB, 1990a). A permitting requirement mandating pollution prevention in conformity to an overall community plan (in this case the Sanitation District Plan) provides for a broader multifaceted rational community approach.

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<sup>80</sup> California is currently also initiating an integrated permit, but irrespective, an EIS would be required if the company is determined to have an impact on the system.

Environmental relationships, which have been most often considered in the context of specific agency missions, e.g. air quality, water quality, Federal and/or state, can be approached through an ecosystem approach—an approach that has been formally adopted and given tools and strategies that now allow for its application if we choose to do so and can persuade those resistant to change.

The CEQA cases all illustrate, at varying degrees of development of the impact assessment process "environmentally preferable" beyond an economic and technical decision and within a broader community policy system, admittedly in ill-defined ways but in the context of an approach that is evolving rapidly in the United States.

#### **9.4 OPERATIONAL POLICY PROCESS CHARACTERISTICS**

To evaluate the NEPA/Pollution Prevention as a policy process and as a valid social choice mechanism that can, as Dryzek (1987) suggests, begin to provide for an environmentally preferable and symbiotic problem-solving policy process, each criterion of rational ecology is presented below.

##### **9.4.1 Negative Feedback**

Negative feedback is advanced by Dryzek (1987) as "the presence of deviation-countering input within a system" (p. 47). The deviations of concern are those that minimize the shortfalls in the life support capacities of an ecosystem as it exists in combination with human systems. Some degree of clarification can be gained by looking at the building blocks for systems thinking which have been advanced by Senge (1990) and are presented as two distinct types of feedback process: reinforcing and balancing.

Reinforcing feedbacks are characterized as the engines of growth with balancing feedbacks in operation whenever there are specific goals to be achieved and maintained. With reinforcing feedbacks, change builds on itself, whether for good or evil.



Balancing (a balanced system) is viewed as movement toward a goal. The ecological rational goal has a system foundation in which the human and natural components begin to approach a symbiotic relationship.

Moving toward a ecosystem/systems understanding in terms of these feedback relationships that are inherent in any man and environment interactions is helpful if policy mechanisms are then used to modify these feedbacks so as to achieve desired goals and support underlying values. There is no fast-track to understanding and manipulating feedbacks in such inherently complex situations, where the systems seem to have "minds-of-their-own" and delays, interruptions, causes and effects may be years/decades away from each other (Senge, 1990).

The EIS process itself is an example of how an action taken in 1970 in the United States has grown into the international agenda. Exhibiting a reinforcing environmental policy phenomenon, the EIS process now leads as a methodology for the international sustainability agenda, a long way from the first EIS experiment for U.S. Federal projects. Experiencing its process application at the Federal level, states have amplified the process and through this bigger and broader agenda, the EIS process is now viewed as a policy vehicle for application in all classes of planning, actions and activities. It has evolved from its early impact fixation to now address the sources as well as the symptoms of ecological systems.<sup>81</sup>

Although it is readily seen that reinforcing feedback has accelerated and widened applications of the process, understanding the balancing feedback associated with the overall goal(s) of the process is more problematic. This is mainly due to the unclear goals and targets established for NEPA and the proposed "harmony with nature," man and environment

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<sup>81</sup> The process has also received bad reviews and just as the EIS is acclaimed in some circles, it is chastised in others as nothing more than an exercise in paperwork (Fairfax, 1978) and others have observed only modest impact (Liroff, 1976, Mazmanian and Nienaber, 1979) when accessed according to the NEPA goal.

relationship. While the EIS process is focused on this interaction, the goals vary as much as the value parameters that can be attributed to a system. In a balancing system there is a feedback self-correction that attempts to maintain some goal or target.

Balancing feedbacks between the EIS policy process and the eco-human system are most clearly associated with two parts of the EIS process. The first is the alternatives section, described by the CEQ (1981) as the heart of the EIS. This part of the process, described in Section 1502.14, is designed to rigorously explore and objectively evaluate all reasonable alternatives including the proposed action. This balancing is intended to help officials make informed decisions that are based on an understanding of environmental consequences and the reasonable alternatives available to them.

The second part is the environmental consequences section, Section 1502.16, which is devoted largely to a scientific analysis of the direct and indirect environmental effects of the proposed action and of each of the alternatives. This forms the analytical basis for the concise comparison in the alternatives section. The analytical basis however, has come to be associated with economic, social, legal and political rationality criteria, rather than the ecological rationality that the process is specifically designed to achieve (Dryzek, 1987).

The criteria by which these Section activities are carried out reflect the uniqueness of time, place, and actors in the process, and there is no broad consensus that the overriding purpose is to always minimize the shortfalls in the life-support capacities of the ecosystem in total. Unless the policy principles are expanded, there may be no context for linkages to the "bigger picture."

Reinforcing and balancing the feedback channels that open-up through NEPA and its corresponding state actions, requires first an understanding of the feedback. Only then can an environmental professional influence the situation. The professional looks for the sources

of stability and resistance and seeks balancing processes to reinforce the goal, a goal which may begin with only regulatory compliance, but nevertheless can be linked to rational ecological criteria. Ultimately, learning will provide the professional the ability to recognize these sources and processes and their long-term implications to corporate strategic "environmentalism."

#### **9.4.1a Significant Environmental Effects and Feedback**

The Significant Environmental Effects described in the Alternatives and Consequences Sections of impact evaluations, include the relevant specifics of the area, the resources involved, physical changes, alterations to ecological systems, and changes induced in population distribution, population concentration, the human use of the land, health and safety problems caused by the physical changes, and other aspects of the resource base such as water, scenic quality, and public services.

Any Significant Environmental Effects Which Cannot be Avoided if the Proposal is Implemented describes any significant impacts, including those which can be mitigated but not reduced to a level of insignificance.

Mitigation Measures Proposed to Minimize Significant Effects provides a description of the measures which could minimize significant adverse impacts, including, where relevant, inefficient and unnecessary consumption of energy.

Alternatives to the Proposed Action describes the range of reasonable alternatives including a "no project" alternative. The alternatives focus on eliminating any significant adverse environmental effects or reducing them to the level of insignificance, even if these alternatives would impede the attainment of the project objectives, or would be more costly. An important requirement of the EIR has been provided through court interpretation (*Residents Ad Hoc Stadium Committee v Board of Trustees*, 1979, 89 Cal. App. 3d 274)

where the EIR is to be governed by "rule of reason." The key issue is whether the selection and discussion of alternatives fosters informed decision making and informed public participation. Discussions of the standards for an adequate selection of alternatives within CEQA have followed court decisions interpreting NEPA.

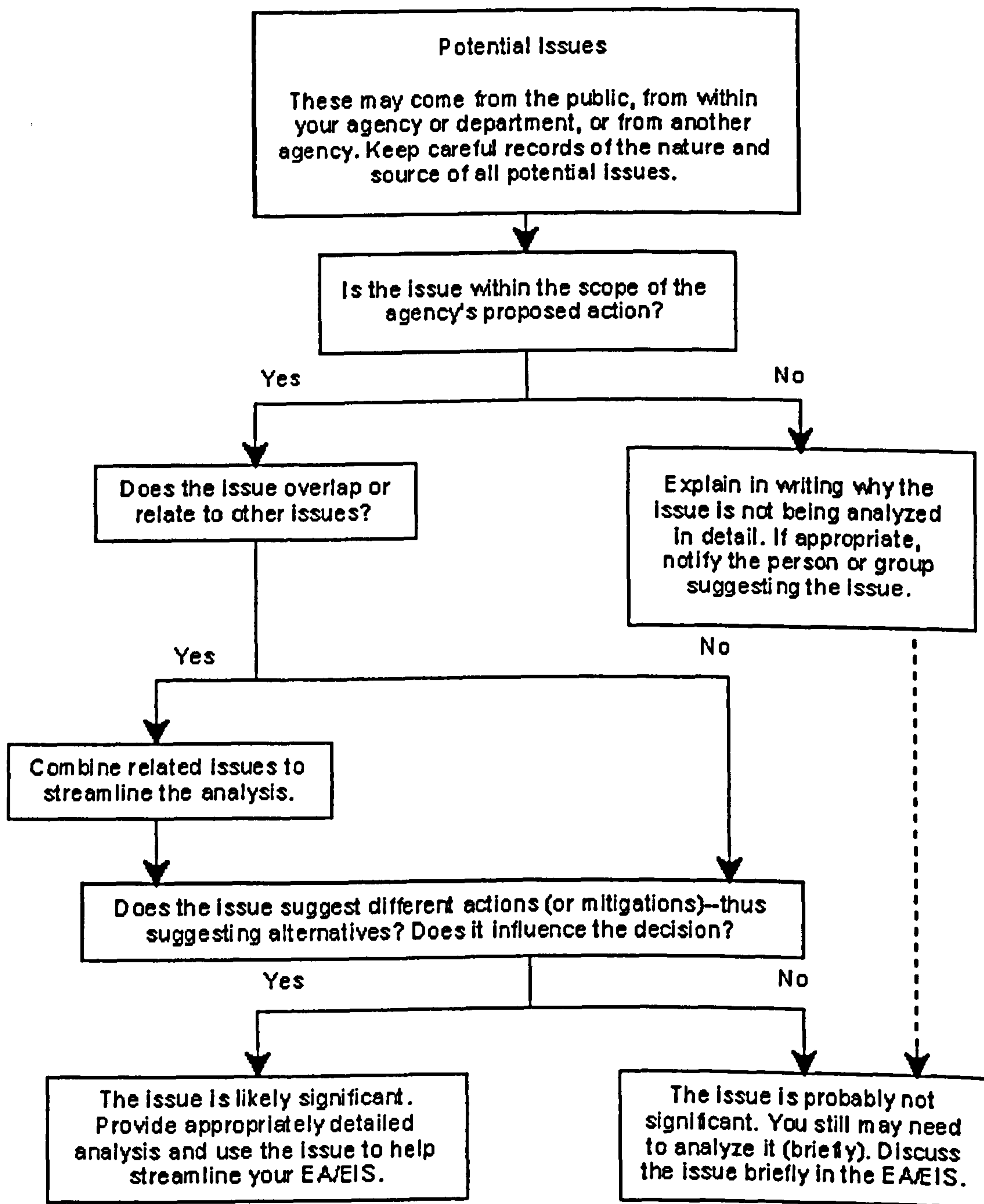
The Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity describes the cumulative and long term effects of the proposed project which adversely affect the state of the environment. The code specifies that special attention must be given to impacts which narrow the range of beneficial uses of the environment or pose long term risks to health or safety.

Any Significant Irreversible Environmental Changes Which Would be Involved in the Proposed Action Should it be Implemented addresses the use of non-renewable resources during the initial and continued phases of the project, as a large commitment of such resources makes removal or non use thereafter unlikely.

The Growth Inducing Impact discusses the ways in which the proposed project could foster economic or population growth, directly or indirectly in the surrounding environment.

The decision making process follows a format which is illustrated in Figure 18.

**Figure 18 NEPA Issue Significance Flow Chart.**  
**Source: Shipley Associates (1994). How to Write Quality EISs and EAs.**



Because the concept of a significant effect on the environment focuses on changes in the environment, the EIR describes the environmental setting of the project so that the changes can be seen in context to the whole. Fostering this interaction between state agencies

is significant to the feedback requirement because large amounts of public money have been put into regional plans in California as a way of dealing with large-scale environmental problems involving air and water pollution, solid waste and transportation.

Regional or General Plans now require long-term planning documents where the local counties have taken their prerogative to expand on the state contents. For example, "Open Space" requirements have been adopted in Solano County. Where a project would run counter to the efforts identified as desirable or approved by agencies in a regional plan, the lead agency in the EIR process has the responsibility to address this inconsistency. The legitimacy of this integration of overall planning has been upheld in court in the decision of the Environmental Information and Planning Council v County of El Dorado (1982) 131 Cal. App. 3d 350.

The open public forum of the EIR/EIS process allows all the actors involved to voice their contributions to the process, but it is acknowledged that the relative importance of the several basic requirements for human life may alter as the public interacts and comments on a proposed project. The development of regional plans however, provides a guide and an "environment" that has been adopted through agency and public interactions. This environment as prescribed through various land use plans must be addressed within the EIR (CEQA Section 1502.16(c)).

If any EIR overrides a land use plan, the decision maker must explain the decision, how it was made, and what mitigation measures are being imposed to lessen adverse environmental impacts (CEQA Section 1505.2). How a proposed project interacts with a regional land use plan or combination of plans, can be a key to overall rational criteria

associated with minimal life support values as a priority.<sup>82</sup>

Integration can be further enhanced by tying the EIR to environmental policy and implementation measures associated with: permitting or other entitlement of use, funding, authority of resources of the site or area (CEQA Section 15366 under the Jurisdiction by law). This is reflected in the CEQA which states that

...any emission or discharges that would have a significant effect on the environment in the state of California are subject to CEQA where a California public agency has authority over the emission or discharges (Section 15277).

#### **9.4.1b EPA as a Reinforcing and Balancing Feedback Factor**

The EPA, as the nation's environmental specialists, have been charged with review of and comment on all EIS documents submitted by the various agencies. Thus, this study can look to the EPA for trends on how EIS actions may be incorporated in feedbacks associated with ecological rationality. Comparable to a "central device" that can provide for environmental monitoring to determine whether rational goals are being approached the EPA acts early and with open communication with other Federal agencies in the EIS process. In addition to a "central" review by EPA, the lead agency undertaking the EIS preparation must consult with and obtain comments from any other Federal agency possessing jurisdiction or having special expertise with respect to the environmental impacts involved in a proposed action (Section 1503.1 [1]). The goal of this requirement was to minimize the lead agency bias, or "tunnel vision"<sup>83</sup> toward a project position as well as "...to balance the differing goals of Federal agencies and meet the government's overall responsibility to promote the purpose

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<sup>82</sup> Local valuations may differ from regional ones. The scale of conflicts may occur regional vs national and national vs international. "Minimal life support" may also vary in the context of rich and poor areas, but the basic criteria and value characteristics for defining "minimal" can remain.

<sup>83</sup> According to Dryzek (1987), the piecemeal approach to problem-solving, so characterized by environmental regulations and agency personnel, supports tunnel vision.

of NEPA" (NEPA Section 2). This "diffusion" throughout the nation, in and among the Federal bureaucracy, and in the courts, has established a system of reinforcing feedbacks, but a feedback that must be questioned as a balancing influence. This question surfaces when criteria varies and rational ecological values have not always been directed to consistent EPA goals.

We can generally say that the EPA provides the only central critical "referee" for environmental decision making in America and, if motivated to move in the direction of inducing balancing feedback more in line with a symbiotic relationship of man and environment, the organization as a feedback monitor would be critically important to the operational concept of rational ecology.<sup>84</sup>

The EPA is also a critical factor in establishing the negative feedback associated with signals of ecosystem stress where, for example, waste assimilation, protection and production capacities are out of equilibrium. While the EPA has not historically addressed the whole of systems, pollution prevention has mandated a change of direction.

#### **9.4.1c            The States and Local Communities as a Reinforcing and Balancing Feedback Factor**

Beyond the interaction and motivational direction issues at the Federal level, the state environmental agencies are also a component of the system addressed under Federal-state relationships. Because there may be differences in perspective as well as conflicts between Federal, state and local goals for resource management, the CEQ has advised participating agencies to adopt a flexible, cooperative approach. In Section 1505.5 (b) the regulations

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<sup>84</sup> The importance of such a referee was discussed by Trudgill 1990, p. 97 as a critical government organization in overcoming the barriers to a better environment. Trudgill comments on his discussion with Charles Secret, of Friends of the Earth (1988), and said "he thought that one of the biggest barriers to tackling environmental problems in the UK was the lack of such a central body" (p. 99).



provide for joint Federal, state and local drafts of an EIS. While cooperation in joint research and studies, planning activities, public hearings and assessments are possible for Federal project actions, states actions are often seen to extend the EIS into a broader operational mode and additional prospects for rational ecological judgements can be found.

This decentralized activity promotes wider citizen participation, access and responsiveness. Efforts by citizens to influence policy through reinforcing and balancing feedback at this local level are held to be within the realm of the possible at this level of governance (Davis and Lester, 1989).

In the California system, the EIS may replace the EIR (CEQA Section 21083.6), and/or work in conjunction with it (21083.7); irrespective, the follow-on EIR monitoring network of state and local agencies is consulted. Also the EIS process adopted through a state automatically brings into the EIS network the state and local agencies and hence the broader project review criteria adopted locally. While this Federal-state cooperation is not perfect (see for example where the California statute contains under Section 15228, provision for "Where Federal Agency Will Not Cooperate"), it does represent a trend toward state involvement, and many would say the some states lead in progressive integrated environmental impact assessment.

The EIS evolution toward rational ecological principles can be followed at the state level and is characterized by the CEQA Environmental Impact (Section 15126) description which covers, through policy provisions, all phases of a project when evaluating its impact on the environment: planning, acquisition, development, and operation.

#### **9.4.1d      Linkage to Pollution Prevention Policy for Feedback Reinforcement**

Environmental policy has required the development of regional plans through the Federal Clean Air Act (Section 110), State Implementation Plans (SIPs) and the Federal

Superfund which requires that all states must demonstrate a 20 year capacity to manage all hazardous wastes (Capacity Assurance Plans).<sup>85</sup> The Clean Air Act has provisions for the classification of areas based on the degree to which air quality criteria are exceeded. This classification is closely tied to overall regional plans as areas must come into compliance with Federal standards. Project impacts on air quality thus becomes an important aspect of the EIS/EIR process.

Water quality is also tied to overall planning as states are responsible for establishing water quality standards which relate to designated use according to recreation, water supply and industrial needs (Clean Water Act). The concept has been adopted that all discharges into the United States waterways are unlawful, unless specifically authorized by a permit and therefore interaction with a state agency is required. The Safe Drinking Water Act applies to drinking water quality in the United States. The Act as adopted through the state's regulation has established a basis for protecting surface and ground water drinking water systems from harmful contaminants.

By the Federal/state relationship of environmental regulation addressing air, water, and waste, regional planning is increasingly taking place and all laws are subject to pollution prevention integration. The integration of pollution prevention in environmental policy will prohibit cross media pollution Thus any state/regional plan adopted for any medium will have provisions such that, for example, the basic air quality requirements for human life are not sacrificed to meet the basic water quality requirements for human life.

Permitting, associated with production processes, as required through various

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<sup>85</sup> The concept and realization of the need for forward planning associated with waste management is relatively new at the state level. California did not have a hazardous waste management planning program before 1987. Prior to preparing the State Plan, it was determined that such a plan would have a significant impact on the environment and thus an EIR was required for the development of the plan.

environmental policies, is also an integral component of tying the EIS or state EIR (California) to broader criteria. This interaction with an EIS process helps relate the ecosystem to an ultimate goal of integrated environmental management, a relevant factor in ecological rationality. The impact of this has been associated with, most notably, the rejection of any operational permits in areas that do not meet particular clean air standards.

While these policy ties can be expanded, this study highlights the linkage to pollution prevention as a means of improving on the feedback mechanism in environmental policy in line with rational ecological values. This tie to improving feedback can be found in the SAB report: "the environment is an interrelated whole, and society's environmental protection efforts should be integrated as well" (EPA SAB, 1990, p. 1). Reilly moved this statement into action through pollution prevention as the cornerstone of all future environmental policy objectives and goals.

The developing state pollution prevention programs in regional EPA offices, have the opportunity to go farther and faster than the national prevention program to foster balancing and reinforcing feedback. As an example, Region 9 operating out of San Francisco and incorporating California within its policy domain, offers a glimpse of the coordination efforts underway.

- **Permitting:** permit conditions mandate up-front reductions in waste to be treated/discharged/disposed; federally enforceable permit requirements.
- **Enforcement:** administrative and civil; negotiated settlements require plant-wide or company-wide pollution prevention projects; environmental audits; and planning.
- **Strategic Planning:** prevention is a driving force in each of four strategic themes. Region 9 work plans; grant funded state work plans; comprehensive ground water protection strategy are elements of strategic planning.

- **Training and Development:** Region 9 orientation; Tahoe State Conference; mobility assignments; pollution prevention work teams.
- **Research and Technology Transfer:** new prevention techniques; focused to small business; 2% Project, VOC substitution in South Coast (2% of Federal EPA funds are being used to stimulate new and creative initiatives in pollution prevention).
- **Information Management:** Toxic Release Inventory; 33/50 Program; RCRA Biennial Reports; newsletter; electronic bulletin boards; library collection.
- **Environmental Education:** 2% Project K-12 Project Curriculum; new office of environmental education.
- **Public Private Partnership:** ECO TECH and UCLA; Pacific Gas & Electric; Green Lights Program (Energy Conservation).
- **Demonstration Projects:** Contra Costs County, large quantity generator; Santa Clara County, pre-treatment metal finishers.
- **Solid Waste Management:** 25% reduction goal; information and education program.
- **Recycling at EPA Offices:** paper, glass, aluminum; paper use reduction; electronic communications (EPA Region 9, Jessie Baskir, May, 1992).

Region 9 attempts to extend pollution prevention into every level of government and industry interests are representative of the "carrot" efforts the government can support. When talking with the EPA Region 9 pollution prevention coordinator, his concern was not if pollution prevention would be incorporated, but when. "If we (the government) can not entice industry to reduce pollution, the public can."

Beyond Federal efforts, a state's pollution prevention program would run concurrently with a regional program and as an example the California pollution prevention program includes the state Alternative Technology Section which supports research and

development and promotes local organizational units such as the California Pollution Prevention Conference for Local Governments. It has been through such initiatives that pollution prevention has been incorporated into permitting, enforcement, ordinances and planning at the local level.

An obvious key linkage mechanism that has evolved is that the EIR process has now been associated with the front-end, i.e. community long-term strategic planning<sup>86</sup> at the project development stage, and at the operational stage, i.e. permitting. In the 1990s dominating the community picture is pollution prevention which now mandates linkage to all media and directly impacts on the cumulative EIR process.

#### 9.4.2 Coordination and Values

Coordination can be achieved through a central arrangement or through a diffusive process. Coordination in the EIS process arises during decision making by agencies and interactions among agencies as well as during decision making with the public. The nature and extent of environmental consideration at the agency level depends on the amount of administrative discretion that an agency is given, the quality of its personnel and its level of public support. While multiple agency consideration can prevent many abuses in the process, insufficient and uncertain information complicates the prediction of complex ecosystem behavior associated with the interaction of physical, biological, social and economic factors.

The "right" opinion in an agency may reflect vested interests, power as well as ideology is involved. Henning and Mangum (1989), in their research, Managing the

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<sup>86</sup> Planning, should be responsive to the larger purposes of society. The researcher recognizes that if economic goals are for example, the only goals of society, then the EIR process would only serve those ends, but if environmental goals are incorporated, then the EIR must also come to terms with those goals of the society. For an 'industrial perspective', on the socialization of mature corporations, where the environmental professional is most likely to be employed, one can examine the potential future of planning systems set out by John Galbraith (1986) in the The New Industrial State.

Environmental Crisis reflect on the need for a greater emphasis on environmental "values" by agencies to prevent problems associated with the EIS process. Their research calls for a central control or major mechanism to ensure the needed coordination and cooperation. The public interest and consultation are called on to assure that appropriate value considerations are incorporated into the process.

The coordination required to achieve concepts of rational ecology values can enter the process in the issues and alternatives to be addressed within any EIS as determined through the scoping process (NEPA Section 1508.26). These issues are reflective of the public and agency values as they understand the issues and the environment. The CEQ has not provided for, established, or required a specific procedure for scoping except that it be undertaken in the community, as agencies are to elicit views of people who are close to the affected regions. A fruitful scoping is viewed as a process which leads to an adequate environmental analysis, including all reasonable alternatives and mitigation measures (CEQ, 1981a).

Members of the public and agency staff engaged in the NEPA process have expressed their views to CEQ that the open scoping requirement is "one of the most far-reaching changes engendered by the NEPA regulations" (CEQ, 1981a, p.1). Predictions have been made that scoping could have the profound positive effect on environmental analysis that CEDM strives for. Scoping can lay a firm foundation for the rest of the decision making process. But it can only do so if the public participates. It is their role to inform the responsible agencies of the potential impacts that should be studied, the problems a proposal may cause, and the alternatives and mitigating measures that offer the best promise of achieving optimal environmental utility.

#### **9.4.2a Scoping or Environmental Mediation and Coordination**

The CEQ has not prescribed the manner in which the public input will be sought, discretion is left to the agency involved. Scoping has led the way to environmental mediation, an outgrowth of the public involvement scoping process since the mid 1970s. Mediation has become an art of settlement referencing a process which suggests a conceptual framework for understanding, reaching decisions and settlements relative to the concerns and issues of the subject parties. The process is lead by a trusted individual or team skilled in the art of negotiation. Such mediation is an evolution of the EIS process that seeks to move Caldwell's call for public participation deeper into government environmental decision making. It also moves the EIS procedure closer to the process intended by Caldwell because mediation tends to move NEPA out of the courts and into the public domain for which it was intended.

Throughout the 1970s and 1980s this means of face-to-face negotiations and consensus building over environmental issues has continued to grow from 1974 when the first mediation case was held, to 1984 when 36 cases were recorded. The majority of mediations in that time period were on land use (86); natural resource management (33); water resources (17); toxics (16); energy (13); air quality (13) (Bingham, 1986). Mediation has grown from an ad hoc procedure to a integrated means to approach the complete EIS process.

The frustrating delays and burdensome costs of making the courts the primary implementing factor of the EIS has led environmental groups and industries to this approach. For example, in a speech at the 1983 meeting of the Chemical Manufacturers Association, Louis Fernandez, chairman of the Board of Monsanto, proclaimed that it was now time for business people, government officials, environmentalists, and concerned citizens to "discard old, combative ways of thinking and acting (and) try cooperation instead of confrontation"

(Amy, 1990, p. 216). The environmental groups are also described as willing to move to an era of bargaining and deal making. This reflects both the technical character of the problems being faced, costs of litigation, and the fact that cooperation with industry is necessary to make the laws already on the books effective (Los Angeles Times, December 22, 1986; and Wall Street Journal, November 20, 1986).

Public involvement, either through scoping or through mediation aspects of the EIS process have gained a foothold in environmental policy and are "...here to stay, in one form or another" (Amy, 1990, p. 232).<sup>87</sup> Dryzek (1987) refers to mediation as one of the few straws in the wind being used in social institutions that has some promise for the type of coordination required in ecological rationality. Dryzek accepts that mediation can at best be used to generalize norms and values. Kept at that level, he believes ecological concerns are kept in "good stead" (p. 214).

To address some of the public communication issues and problems associated with the public's ability to influence environmental impact, research by Langton (1984) expands on Dryzek's mediation gains, and he has indicated that through the evolution of public process activities and environmental leadership new competencies have also been gained in:

- professional administration including information systems;
- the ability to foster collaboration;
- the development of political actions skills;
- the ability to access and develop technical information; and
- the development of a new educational orientation toward the public with respect a concern for economic as well as environmental values.

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<sup>87</sup> Rosenbaum (1989) describes the political controversy that erupted when the Reagan Administration's aversion to public participation at EPA became evident. The administration was forced to revive the practice.



This trend for increased public involvement, while not comprehensive, reflects the overcoming of many of the early problems associated with public participation activities and depicts a worth-while picture of the future coordination efforts aimed at continued public discourse.

#### **9.4.2b EIS "Productive Harmony" and Coordination**

While the public participation component is foremost in CEDM philosophy, it has to be recognized that the public's activity means that a range of "values" will be proposed as goals. This poses a problem for the EIS in a CEDM context. This is the lack of developed expressed, normative and instrumental values of the environment which according to Caldwell (1964), are the "first steps toward making environmental concepts operational" (p. 12). The NEPA policy provides a value for man and environmental relationships, "productive harmony" (NEPA Section 2) but this is an ambiguous term, that defies clarification. Does it mean ecological balance, public health, outdoor recreation, wilderness preservation, neighborhood hazards or the productive, protective and waste assimilative capacity of an ecosystem? Choosing the appropriate values as utilities, significant means to determine those utilities and priorities where there is conflict is one of the critical issues for the future that has been identified by, among others, Ingram and Mann, 1989.

In retrospect, Caldwell (1989) noted that the EIS purpose would be clarified if it had been more explicitly linked to the substantive precepts enumerated in the first section of the Act, i.e. exactly how is "productive harmony" to be accomplished. The lack of even generalized values has been identified by Liroff in his study of NEPA as contributing to "negotiated environments" whereby the agency conducting/participating in the EIS has been identified as at least part of the problem by focusing on institutional survival and thus avoiding risk associated with innovation, creativity and adoption that NEPA policy demands

(Liroff, 1972 and Liroff *et al*, 1973).

The study by Landy *et al* (1990) picked up on this issue again in 1990, where the problems which had been encountered were seen to have been perpetuated by the EPA avoiding the reality of the environmental situation. Thus "negotiated environments" have been made to fit various legal, bureaucratic, and political imperatives, in effect the environment had been "boxed" (p. 282).

To the extent that NEPA concepts remain ambiguous and vague to the public, values associated with CEDM will be ambiguous as well, subject to public interpretation as each issue arises. While this has led to early operational difficulties and conflicts in the EIS process, the problem can be strategically addressed through policy implementation modifications as well as evolution to other policies. Fostering such public debate and public understanding has been called the EPA's officials "highest calling" by Landy *et al* (1990, p. xii). The Landy study recommended that the EPA present a clear vision of what is at stake for the agency and for the public.

The history of the agency's framing of the environmental questions in the past has been severely questioned by Landy where in the work, The EPA: Asking the Wrong Questions he states that the widespread public misconceptions about the nature of environmental issues that prevail today are due in no small measure to the shortcomings of EPA involvement in public education.

...EPA did not provide the public with a clear and complete account of the issues...Citizens were encouraged to believe that questions were much simpler than in fact they were (p. 280).

Landy has challenged the EPA to characterize which elements of the problem are most important, a challenge that is a stage in the process of obtaining public consent to a coherent synthesis of problem solving techniques.

While this identification of EPA's shortcomings is not disputed, it is only a symptom of the general understanding of the time. In 1988 the Director of the agency, Lee Thomas, was openly acknowledging that the EPA needed to vastly improve their understanding of the complex networks of interacting biological and physical systems that make up the natural environment in which we live, a call that had been picked up by Reilly in the 1990s. EPA's knowledge of the environment and ecosystem processes was described as still rudimentary by Thomas and tools for environmental assessments and ecosystem evaluations were lacking according to Reilly (Thomas, 1988, 1988a).

The EIS process has irreversibly reconstructed the relationships between organized interests and agencies by the creation of a new means of access to government and industry decision making. The environmental interests and their allies have made the greatest net gain in political advantage. While the litigation activity on NEPA is controversial as to its technical merit, it has nevertheless promoted citizen participation and access to the courts (Melnick, 1983).

Caldwell describes the process of public review and comment required by NEPA through the EIS process as an "early warning system" for environmental interests that can be applied to long term implications of emerging policies (1982 p. 72). Perhaps the most supportive evidence for the ecological rationality of the EIS process was expressed by Rosenbaum (1989): "Today, the public involvement provisions of NEPA appear to be among the few public participation arrangements of the early 1970s with continuing vitality" (p. 231).

#### **9.4.2c Linkage to Pollution Prevention Policy for Coordination and Values**

A central premise behind pollution prevention has been characterized by the Science Advisory Board (SAB) which calls for the EPA to move from a "reactive" agency to a

preemptive agency. The SAB provided ten recommendations for EPA. In these recommendations the EPA's emphasis on the stability and quality of ecosystems provides direction and clarification for coordination and values.

This SAB report, providing the strategy behind the pollution prevention agenda, directs the EPA beyond human health criteria to become more focused on opportunities for environmental improvement that are integrated, to deal with the diversity, complexity and scope of the environmental problems of today (EPA SAB, 1990). While NEPA made practical the utilization of a wide variety of scientific disciplines in ensuring a maintained environmental quality, the SAB offers one tool that can help foster the evolution of an integrated and targeted national environmental policy—the concept of environmental risk. Risk assessment is the process by which the form, dimension and characteristics of that risk are estimated as a scientific activity.<sup>88</sup>

Risk assessment can be used for different purposes, the most common is in regulatory decision making where the cost-benefit of the regulation is based on the amount of risk reduced by the regulation as calculated by some type of risk assessment. Risk assessment is also used to describe and define acceptable risk, most commonly in the context of excess cancer risks to the individuals most exposed. Another use is for priority setting which involves comparing one specific risk to another. The most recently advanced use of risk by the SAB is for priority setting for government programs and budgets. This fourth use represents the most significant contribution by the Pollution Prevention Policy. It is also the use receiving the most attention by Congress, with Congress introducing legislation requiring

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<sup>88</sup> Risk management is the follow-decision process in which the scientific conclusions of the risk assessment are weighed among other considerations. William Lowrance (1976) provides for the complete basic tenets on risk assessment and risk management. His principles of the practice have been endorsed by the National Research Council and adopted by the EPA.

this type of priority setting to be instituted within EPA. The belief is that risk assessment is the best approach to provide a "scientific" way of making and justifying difficult budget choices. The ultimate form of the risk assessment process is critical to the realization of rational ecology.

The SAB has established an Ecological Processes and Effects Committee which works with the EPA's Office of Research and Development (ORD) to develop an updated risk assessment process. This more progressive process is called ecological risk assessment. Ecological risk assessment is a process that evaluates the likelihood that adverse ecological effects may occur or are occurring as a result of exposure to one or more stressors.<sup>89</sup> A major component is the Ecological Monitoring and Assessment Program (EMAP) which is intended to provide the backdrop of scientific data against which EPA can evaluate policy decisions against ecological data.

The distinctive nature of the ecological risk assessment framework results from the different emphases placed in three distinct areas. Ecological risk assessment considers effects beyond those on individuals of a single species and may examine population, community, or ecosystem impacts. There is not one set of assessment endpoints (environmental values to be protected) and endpoints can be selected on both scientific and policy grounds. The "comprehensive" approach of ecological risk assessment moves beyond the traditional emphasis on chemical effects to consider the possible effects of all stressors (any physical,

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<sup>89</sup> The relationship between ecological risk assessment framework to the framework for human health risk assessment developed in 1983 by the National Research Council (NRC) and subsequently used by the EPA is as follows: The human health risk assessment follows four phases: hazard identification, dose-response assessment, exposure assessment and risk characterization. The NRC's framework did not include a problem formulation phase, but the EPA addresses that issue at the beginning of all EPA risk assessments. In the ecological risk assessment's analysis phase, characterization of exposure is the same as exposure assessment, while characterization of ecological effects includes aspects of both hazard identification and dose-response assessment. Ecological risk assessment uses the term "stressor response" rather than "dose-response" because historically the term "dose-response" has only been used for chemicals and ionizing radiations. The risk characterization phase is similar in both cases.

chemical, or biological entity that can induce an adverse effect). Adverse ecological effects include a wide range of disturbances ranging from the harm to an individual organism to the loss of an entire ecosystem function.

The methodology revolves around problem formulation, analysis and decision covering a process of qualitatively or quantitatively estimating the magnitude and probability (when feasible) of biological effects from exposure to individual or multiple stresses. The process used basically evaluates two fundamental types of scientific information: the ecological effects resulting from a stress, and the spatial and temporal intensity and duration of the stress (EPA, 1992a, b, and c). This framework offers a basic structure and starting principles for EPA's ecological emphasis promoted through the pollution prevention agenda.

This process is being considered as a scientifically objective basis for public policy mandates—and an attempt to move beyond value "perceptions" and toward a consensus on what are the values of an ecosystem that policy should support.

The man and environment relationship in the ecosystem can be an explicitly characterized environmental value to be protected. Values are the assessment endpoints, the focus of the risk characterization and the link to policy goals. Thus, these values must be ultimately based on ecological relevance, policy goals and society values and the susceptibility to the stressor. Ecologically relevant endpoints reflect important characteristics of the system and are functionally related to other endpoints. Currently the interpretation of ecological relevance is at the limits of scientific understanding, but the EPA is following through with various workshops and development statements to advance research into the ecological principles that need to be considered and the subject matter of future ecological

assessment guidelines.<sup>90</sup>

An ecologically based risk assessment process can provide a starting point for the formulation of generalized norms and values, at least a starting point that moves toward a utility and beyond the coordination and value environmental value vacuum often found in NEPA. Issues and their adverse effects identified and quantified in an impact assessment will many times be arbitrary and based on perception rather than sound science. An integration of ecological risk assessment principles within NEPA can illustrate this. In the EIS process, potential issues are determined from the public or from within the agency or department taking responsibility for the EIS process. Several issues may be related. If this is the case, the agency may combine related issues to streamline the analysis. To do so, the agency asks if each issue suggests different actions or mitigations, or does the issue influence the decision? If the answer is yes, the issue is considered significant and the appropriate detailed analysis will take place. A decision tree format conceptualizes how an issue is determined significant or non significant. At the point where the question is asked if the issue is within the scope of the agency's proposed action, the process can integrate a decision model associated with the interactions of anthropogenic and natural stresses linked to factors determining production, protection and waste assimilation.

The importance of risk assessment is reflected in the number of legislative bills dealing with risk introduced at the 1994 Congress which concluded in November, 1994. This Congress has been described by Terry Davies (1995) as "the Congress that discovered risk analysis" (p. 5). Risk assessment is seen by Congress as a powerful tool for improving

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<sup>90</sup> The first EPA agency wide effort to identify and discuss the elements of ecological risk assessment began in 1990. Meetings began with the discussion of important scientific issues, followed by a framework document in 1991. By 1992, guidance forums were being held and by 1993 peer reviews (EPA, 1992 a, b, and c)

environmental policy and decision making. The hope at this point is that the Congress will not use risk assessment for other purposes that do not advance ecological decision making.<sup>91</sup>

While it is not necessarily the case that good scientific information always fosters good policy, or that science can assign a value, the comprehensive nature of the ecological risk assessment process provides the professional with an orientation based on sound science grounded in ecological principles.

Education and information are a central premise of pollution prevention. For example:

- EPA Region 8's "Environmental Scholars Program" has brought environmental education into the classroom.
- Region 9 promotes training for Federal, state and local environmental agency staff.
- EPA has established a national pollution prevention center at the University of Michigan which will develop curriculum for engineering, business and other university education tracks as well as disseminate the material to other universities nationwide.
- An office of Environmental Education with pollution prevention forming the core of the office's approach is now a component of the agency.

The EPA recognizes that creating this new "pollution prevention ethic" requires a shift in perspectives of those whose activities affect the environment. Without question, this is a massive undertaking, and one that will continue to challenge the Agency and all of society in the years ahead. In the early 1990s at the EPA, Gerald Kotas, Director of the Pollution Prevention Division, had this to say,

...we must realize that the shift to pollution prevention is relevant not only

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<sup>91</sup> As an example, some risk assessment directions proposed in Congress would mandate making risk guidelines judicially enforceable. This would transform risk analysis from a scientific undertaking to a legal one, and the exercise of sound science would be precluded by legal roadblocks.



to government inspectors and regulation writers and company executives. It is relevant on the plant floor, in the shipping department, in every office and workplace, in every professional training course, in our universities, high schools, elementary schools, and in our households. Pollution prevention is not merely a strategy for environmental protection; it is part of a strategy for protecting our children our fellow workers, and our quality of life (Pollution Prevention News, October, 1991).

#### **9.4.3 Robustness or Flexibility in Policy**

Robustness in policy can be assessed in terms of its lack of obvious dependence on a restricted set of conditions. Flexibility is associated with the "degree of steadfastness of performance across varying conditions" (Dryzek, 1987, p. 52). Each policy condition should allow for change and evolution to meet the conditions at hand.

The "institutionalization" of NEPA was the foremost objective of the legislators and administrators who vigorously pursued the enactment, and now the implementation of the law. Stability of the EIS process can now be characterized by its secured position within the Federal and state governments. While the early years of NEPA showed a high reluctance to comply with NEPA requirements (Cortner, 1975), more recently progressive agency administrators have shown a capacity to reach beyond the minimum standards of the process to strive for integration of the environment into decision making (Bear, 1988). The EIS process has set a precedent to build environmental concern into Federal agency thinking.

It is important to emphasize that Section 102 of NEPA mandates the quality of data as well as the method of its utilization in administrative policy making; agencies are required to "utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental arts" and to develop arrangements that will "ensure that the presently unquantified environmental amenities and values may be given appropriate consideration in decision making along with economic and technical considerations" (NEPA Section 102 (a) and (b)). According to Caldwell (1989), it is this type

of integrated, interdisciplinary use of the natural and social sciences that is required.

NEPA requires agencies to address specific issues in all EISs: the environmental impact of the proposed agency actions; the alternatives to the proposed action; the relationship between long-term and short term impacts from the proposed action; and the irreversible and irretrievable resource commitments for the proposed action. A linkage between information quality and procedural decision making is seen as the essential nature of the process. According to Caldwell (1984) and Taylor (1984), NEPA assumes that changing the rules of governing the generation and distribution of knowledge will change the political and intellectual content of agency decision making.

The process has performed under a wide variety of circumstances and, where quality has been questioned, the courts have had a significant impact on clarification and establishing process requirements. Caldwell (1984) and Taylor (1984) both believe that the judicial scrutiny has compelled agencies to make substantive changes in EIS documents, and that these changes at a minimum compel strict procedural compliance with Section 102 of NEPA.

Taylor (1984) described a rough but telling standard of judging outcomes of the EIS process: "The EIS process not only tends to produce environmentally better outcomes but does so in some socially efficient sense by making the right kinds of distinctions among situations" (p. 150).

The EIS process has shown itself to be adaptive to exploiting change as any mechanism must for long term application. The EIS process itself changes as provisions for revisions are discussed and agreed upon with the CEQ. In 1992, the CEQ modified regulations for the Department of Energy, USDA Forest Service and the Bureau of Land Management. CEQ (1993) is revising seven other agency regulations associated with NEPA. The diversity of the EIS has allowed the process to open up new niches in environmental

decision making where, for example, environmental mediation has become popular in cases involving industry and waste facility siting. Non-adversarial mechanisms, such as local citizen dialogue, and informal bargaining alongside mediation have become increasingly important in resolving local debates. The process has altered the structural relationships between organized interests and agencies by creating new means of access and new political strategies that seem most to benefit environmental groups (Amy, 1990 p. 219). Such approaches and relationships can be viewed as positively adapting the goal of the EIS process as long as care is taken to include all stakeholders and values into the discussion.

Environmental issues subjected to the EIS have expanded where, for example, energy efficiency is now a component of the evaluation process. A focus on ecological issues has been given through the CEQ's responsibility functions, workshops were held in 1992 that addressed the inclusion of biodiversity in the EIS process. At NEPA regional conferences in 1992 environmental professionals presented papers and case studies on methods of incorporating ecological principles into the EIS process. Methods presented include the integration of geographic information systems (GIS) and data available through the Nature Conservancy's Natural Heritage Program. To get the big picture effect of projects, Cumulative Impact Analysis methodologies and conceptual approaches are also being developed to broaden the scope of the EIS in collaboration with the Canadian Federal Environmental Assessment Review Office (CEQ, 1993).

The most extensive example of the EIS ability to adapt is its now commonplace application throughout the international environmental community and in its requirement by international agencies. The Convention on Environmental Impact Assessment in a trans-boundary context is now in effect with the CEQ currently developing guidelines to implement the Convention for projects with significant adverse trans-boundary environmental impacts

(CEQ, 1993). The globe's largest multilateral-aid organization uses the EIS as part of their appraisal system with their policy of "full integration of environmental issues" into aid activities (Conable, World Bank President, 1989, p. 43-44).

The policy quality values of robustness and flexibility can be found within the EIS process which has had varying degrees of influence and success. Linkage to an established controlled transition mechanism such as pollution prevention can be relevant to a meta-design leading toward rational ecological attributes.

The fully developed attributes of NEPA's EIS process are still to be written—the idea of commitment to ecological values within Federal agencies is a matter of ongoing debate and critical study, but the merits of the EIS process are sufficient for it to provide a mechanism to move toward greater degrees of CEDM based on rational ecology criteria.

#### **9.4.3a Linkage to Pollution Prevention Policy Reinforcing Robustness or Flexibility**

Of the critical issues relating to environmental efficacy, sound knowledge and information on the ecosystem must provide the base for decision making. The SAB report has acknowledged that United States environmental policy must evolve in several fundamental ways. One of the integration needs that has already been noted is, that as regulatory and non-regulatory tools become available to protect the environment, they should be used to assess and address the problems that are the most serious, i.e. a consensus must be achieved on the relative importance of different environmental issues in various contexts.

The concept of environmental risk, together with its related terminology and analytical methodologies is seen by the SAB as being of help to people in discussing disparate environmental problems with a common language. Although current abilities to assess and quantify ecological risks are not well developed, the SAB is calling for the EPA to begin to

apply its resources toward the long term public policy issue of understanding relative risks to the ecosystem. The report calls for "sound science" to lead the agency priorities and to relay information to the public based on ecological priorities.

Pollution prevention policy has set in place a strategy that can be linked to scientific credibility and resource value understanding that can be integrated across the EPA to provide the basis for environmental decision making through NEPA. Pollution prevention has now been adopted in some form in all fifty states and remains a principal item on the agenda at EPA. Pollution prevention has survived the Bush Administration and remains a priority in the Clinton Administration, and has set in motion its own economic force factors.

#### 9.4.4 Resilience in Policy

Acid rain, the hole in the ozone layer, the greenhouse effect, air pollution, nuclear waste, water pollution, soil contamination, the destruction of tropical forests, pesticides, hazardous waste etc. are all environmental problems that have already moved the natural ecosystems away from the equilibrium range. Systems to address the severity of these problems must include some mechanism to "steer human and ecological systems back to normal operating range" (Dryzek, 1987, p. 54).

NEPA's EIS process does not directly provide for a repair mechanism, but we can look to another component of NEPA which requires the CEQ to provide the nation with a comprehensive environmental program and registry of environmental conditions and trends. While the CEQ did not lay the groundwork for the nation's principal legislation, The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA),<sup>92</sup> does address a movement back to "operating range." Its environmental conditions and trends

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<sup>92</sup>From 1980 to 1992 its' repair provisions related to 37, 598 site locations with 1,252 on the National Priority List for clean-up (CEQ, 1993).

reporting provides the environmental data to support the need for companion regulation.

Collecting data to determine environmental conditions and trends is seen as essential for making and evaluating national environmental policy. Such information defines the long term health of ecosystems and identifies potential causes of environmental degradation. There are approximately 83 environmental data programs in twenty five different Federal agencies as well as state and local data programs for the fifty states. Using these sources the CEQ, through the Interagency Committee on Environmental Trends, had set its goal in 1994 to develop an ongoing process of data exchange and environmental reporting that will provide comprehensive state-of-the-environment reporting (CEQ, 1993).

The key questions to include when asking if such reporting has provided answers to ecosystem utilities are:

- Are environmental conditions getting better or worse?
- Have environmental programs resulted in measurable environmental improvements?
- In what areas have changes been most noticeable?
- What is the cost of specific environmental improvements?

And in relation to steering rational ecological feedback information needs:

- Are the right measurements being made to underpin appropriate negative feedback?

It is only when these questions are answered that direct actions to put new mechanisms in place can be established.

#### **9.4.4a Linkage to Pollution Prevention Policy to Reinforce Resilience**

Environmental data generated through collection programs, adequately answering the questions posed, provides the support needed whereby "operating ranges" can be identified. Data must relate to production, protection and waste assimilation individually and in their inter-relationships. There has been much research on the fate of chemicals in the

environment. As an example, "critical loads" assessments determine the properties of an ecosystem and its sensitivities to a pollutant. While much research remains to be done the concept is seen as, at least, one of the means for determining environmental quality parameters of an ecological nature. Ecological risk assessment is an evolving concept; both it and "critical loads" assessments are based on the scientific principles that have led the SAB to determine environmental priorities on the ecosystem and global scale.

The SAB's findings have been important in the EPA's response to move the pollution prevention ethic throughout all policy, programs and operations of the Agency. While any change of emphasis will take time, environmental offices such as the Offices of Water Quality are actively making strides in new approaches to water quality. The water quality program is moving toward ecological protection where the protection of an ecosystem is on the same footing as human health. This is underpinned by a view that "Over the long-term ecological degradation either directly or indirectly degrades human health and the economy" (EPA SAB, 1990).

Another change in emphasis is taking place, from control systems associated with national standards and sewage-treatment plants to individual ecosystems and watersheds. Extensive programs are underway to bring life back to ecosystems that have become polluted due to an outdated concept of control, through which pollutants are moved from one media to another.

By early 1996, the EPA is using health data to revise the Clean Air Act. This Act, reflecting implementation costs described as the most expensive in environmental regulation history, is currently being debated at the national level. To reflect these activities, the offices' at EPA are being reorganized to focus on better science, ecological protection and geographical targeting.

Means to move an ecosystem back to "operating range" can be found in off-shoot pollution prevention programs where the EPA is trying the approach of whole-systems environmentalism. Under this approach, the Great Lakes ecosystem solutions address three persistent problems: the deposition of pollutants through the air; runoff from agriculture, urban and other non-point sources; and the restoration of critical habitats. This program can be linked to the SAB's determination that the EPA has neglected the natural ecosystems—wetlands, estuaries and forests. This program, seen as a model for how the EPA can move forward, from planning to implementation, to protect and restore other water bodies, is trying to put all the ecological pieces together and the EPA has joined forces with the surrounding states and provincial governments of Canada to ensure successful program development. This involvement brings not only additional policy and financial resources, but also authority in the areas of land-use and water planning which is critical to restoring the lakes. Citizen groups are involved through outreach, consultation and communication programs.

Another activity that mobilizes the important resources needed to bring about change is convincing a region to alter or involve the very activities that sustain its economy. An example of this at the EPA is through the National Estuary Program which is working with a citizens coalition group dedicated to restoration of the Louisiana coast. The coalition works for local policy initiatives that treat the delta areas as a dynamic ecosystem, resulting in the creation of a wetlands restoration fund supported by gas and oil (the economy of the area) revenues.

In an example of prevention being better than cure, the Gulf of Maine, one of the world's most productive water bodies, is the focus of an action-plan that is incorporating the integrated concepts of NEPA's provisions for data collection, impact assessment and



pollution prevention. The action-plan is seen as a "long-lived" protection program that has evolved from agreements made between scientists, fisherman, bureaucrats, academicians and citizens, all recognizing a common value of the Gulf. The action-plan thrust is prevention; its theme is cooperation.

Community actions plans using the EIS process and integrating pollution prevention are exhibiting ecological rationality in practice. Communities have developed unique plans and follow-up actions for dealing with the disequilibrium between man and the environment. Humans have made strides as problem solvers, irrespective of many of the policy actions in NEPA, and pollution prevention has and continues to be instrumental in navigating through the complexity of maintaining and restoring ecosystems/communities.

## 9.5 OPPORTUNITIES

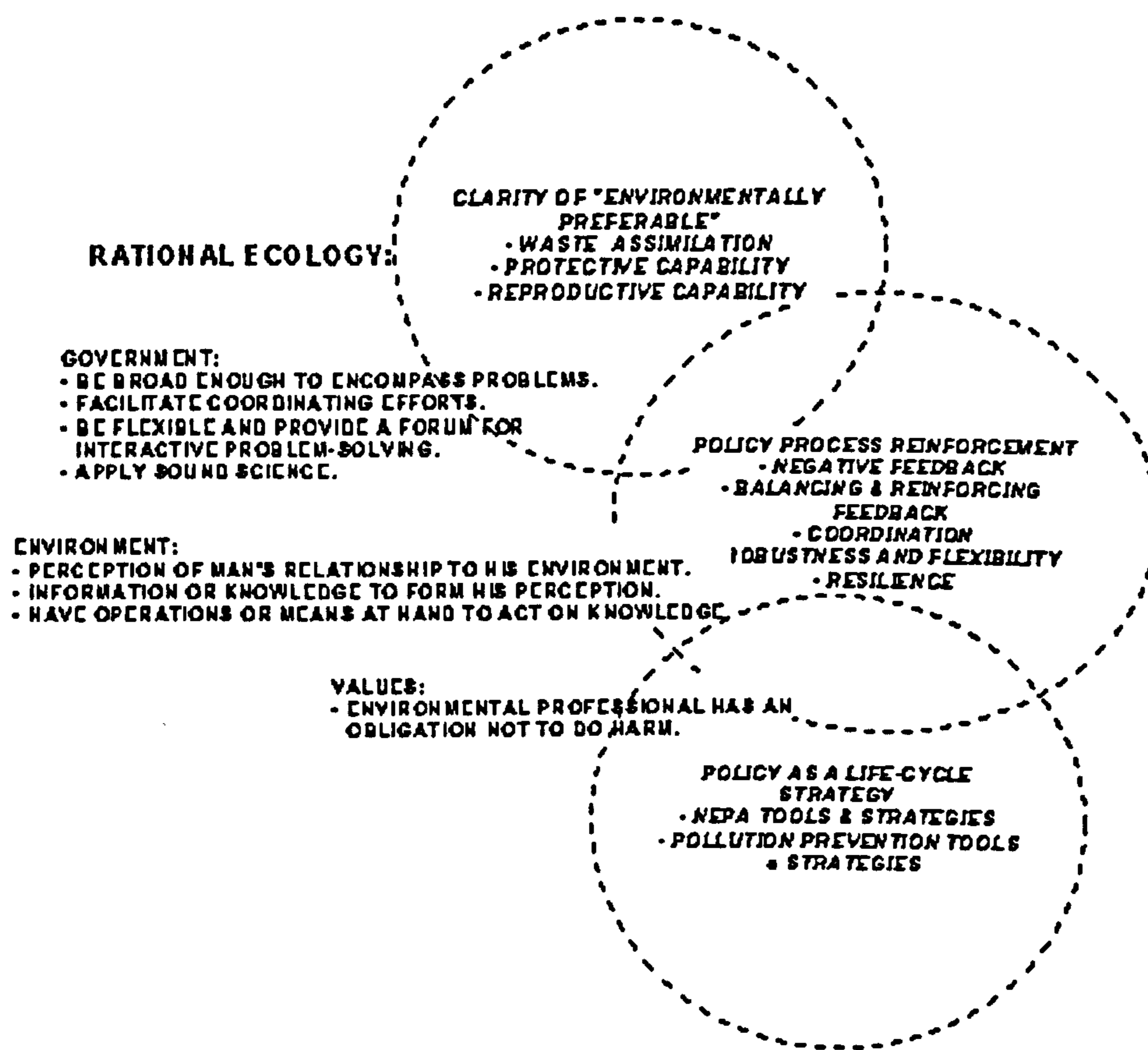
Together NEPA and pollution prevention policy constructs must at a minimum provide circumstances for negative feedback and coordination as a condition for ecological rationality. Robustness and flexibility are substitutable but one or the other must be operationalized. Resilience is contingent on the condition, time and place and is not a necessary condition for rational ecology but is important as a criterion because pollution prevention is a means to buy time for systems that will eventually become naturally regulated. That is, it ensures that humans minimize their destructive forces on an ecosystem—in hopes that the ecosystem can rebuild itself.

According to Dryzek (1987) the possibility of design as a conscious innovation in social choice is a real-world possibility. Dryzek tells us that this path can take two roads, start anew or think of ways to enhance ecological rationality in existing social choice. NEPA and pollution prevention provide existing and potential evolving policy choices that represent avenues supporting CEDM. This case study reveals some of policy attributes and

mechanisms which contribute to a rational perspective which seem suitable for the environmental professional whereby early directions for CEDM opportunities can be advanced.

The strengths of using current policy aligned with rational ecology stretches policy goals to better align with the President's Council on Sustainable Development where regulation needs to become more performance-based, and supplemented by stewardship responsibilities. Reforming policy in the direction of rational ecology requires considerable emphasis on more place-based policy approach. What are the implications of this for professionals?

The study suggests that it will take time and training to make rational ecological utility the general basis for action. However without the basis and promoting factors found within current policy and management constructs, the possibility of its application would be slim. It is important that the environmental professional understands not only the opportunities for policy linkage but the feedback processes that can advance the overall business and strategic management agenda, i.e. the linkage to systems thinking in policy agendas and in business operations. Figure 19 indicates the impact of rational ecology on policy processes and on perceptions, information and operations related to the environment, as advanced by Caldwell.



**FIGURE 19 RATIONAL ECOLOGY REINFORCING CEDM**

Using the policy understanding gained through this case study, opportunities can be found that support the kind of CEDM envisioned by Caldwell. With the further understanding that operational opportunities must be embraced, not from a utopian vision, but from the real-world in which policy provides some starting points for government, citizen and professional interaction, two additional case studies are offered.

If a "functional" citizen can emerge from professionals in the business community where environmental policy has implementation requirements, some progress will have been made toward Caldwell's idea, admittedly not through holistic ideology, but through policy tools and business strategies, or environmental quality and economic growth.

## **Chapter 10: INNOVATIVE INFRASTRUCTURES**

### **SUPPORTING CEDM**

Business operates in a social environment where commitment and personal ethics form the basis for corporate responsibility. It is commonly believed that the integration of economic and social values and goals must be achieved in order to advance industrial society into the next era, i.e. to achieve economic growth and environmental quality. The business institution is being called upon to accept the role for resolving the increasing interdependencies associated with the advancement of the industrial society into the next century. The degree of success business is able to achieve is judged by the results of critical decisions made on behalf of economic gains as a positive and contributing factor to the realization of society's increasing demands for a cleaner, safer, healthier environment along with the broader quests for greater equality, morality, and social and environmental justice (Marcus *et al*, 1987).

Innovative infrastructures to deal with this responsibility have been advanced earlier in this thesis as a supporting element of CEDM. The following case studies take a closer look at a compelling management strategy that is evolving on a global scale. Strategy investigation begins with a reflection on strategic environmental management, a term linking both environment and management priorities:

- How companies can respond to the growing need for more effective management of environmental resources;
- A plan for action that leads to the consideration of the environmental impacts of company products, services, and activities and the benefits of sustainable development;
- A broader consideration of the interactions of companies with their various stakeholders;
- A process that produces more effective and efficient corporations that are both more profitable and more environmentally responsible; and
- Decision making processes that address environmental, health and safety, operations, accounting, and finance (Takaki, #4, 1996, p. 8)

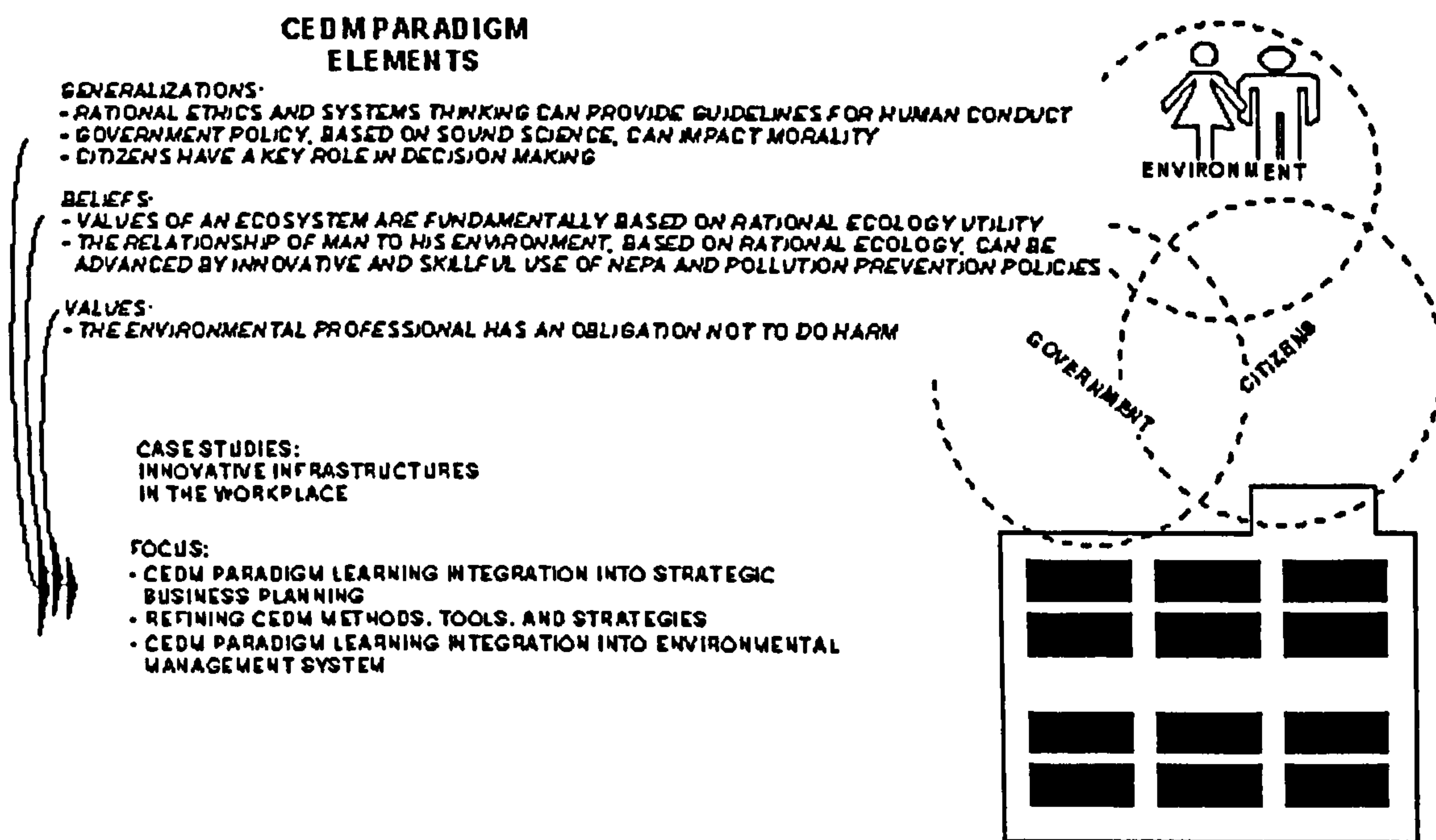
A corporate infrastructure that successfully supports this type of strategy is today considered innovative in corporate circles. Changing the structure of a business and its relationship to the environment may be initiated by a search for legitimacy, ethical norms, social accountability, competitive advantage, or as a response to social and/or political structures. In any event, in responding to these issues, the corporation becomes a multipurpose institution producing economic and social betterment by using its resources to effectively address policy issues. If there was no place in this structure for the environmental professional, these case studies would be of little relevance, however, this is not the case.

The prospect of being accountable to the social/common good, beyond a regulatory compliance requirement, is being thrust upon the environmental professional. Responsibility of this nature requires a strategic learning agenda and the researcher has argued that the CEDM paradigm provides the basic insights to understand the prospects for social accountability for the common good. These prospects are often linked to the idea of making a commitment to the environment, surpassing the compliance orientation of most environmental professionals operating in business and government agencies today.

A standard methodology associated with advancing this type of business strategy came to the forefront in Britain with the introduction of BS7750, Environmental Management Systems (EMS). More recently, the international community has accepted this method of dealing with the environment and the Organization for Standardization (ISO)14000 series of environmental standards has been advanced. ISO14001 represents the standard framework for EMS. In parallel to the development of EMS internationally, the United States agenda has been progressively moving forward with pollution prevention programs in industry and in government. NEPA, Pollution Prevention, and EMS provide tools and strategies that can further advance CEDM as the standard paradigm for developing

business strategies that address the common good.

This Chapter presents two case studies on the design and implementation of an environmental management strategy. In both cases, the researcher is considered the environmental professional working within the business network. The cases represent an evolution of CEDM learning and implementation using EMS as the business/agency application resource most likely to reinforce and advance the CEDM paradigm in the business setting. Figure 20 shows the relationship of these case studies to CEDM learning.



**FIGURE 20 INNOVATIVE INFRASTRUCTURES REINFORCING CEDM**

**10.1 CASE STUDY - CEDM LEARNING 1992**

"Ultimately, the social legitimacy of business decision making depends upon implementing decisions in a way that effectively addresses both the corporation's private, economic interest and the society's broader sociopolitical interests. To do so it is necessary to integrate public policy issues into the corporation's strategic plans" (Marcus *et al*, 1987, p. 91).

### 10.1.1 Case Study Setting

In 1975, an engineering and scientific research firm (the company), was established in Britain to support the consulting services of a Swiss parent company, and to take advantage of the cheaper operating costs and market opportunities. With the growth of the nuclear industry in Britain as the cornerstone, the office soon established itself with its own clients and follow-on service base. Today all of the current management have advanced through the British office.

In the late 1980s the company management wanted to expand its consulting within the nuclear and non-nuclear sector by offering environmental and risk assessment services. To this end, a nuclear physicist was hired to develop the environmental service. Three additional staff were hired representing ecology, geology and aquatic/biological sciences. The new service section naturally gravitated toward the nuclear market providing environmental impact and risk related studies. The service section later lost the ecologist and geologist, the physicist and biologist stayed and remain with the company. Environmental work began to expand outside nuclear and into the oil and gas industry, all in response to issues surrounding impact analysis.

By the early 1990s, the nuclear physicist, now the company's Scientific Advisor, had developed an extensive client list within the nuclear industry, and interests in environmental development outside that area were put on-hold. Because of the Advisor's heavy work load, another "environmental manager" from the nuclear industry was hired which reinforced the focus on the nuclear industry. In mid 1992, the Scientific Advisor, the Nuclear Division Office Manager and the Manager of the Nuclear Division interviewed, and subsequently hired, the researcher for a position as an "environmental scientist."

Following past practices, the researcher was located within the Nuclear Division and

the Scientific Advisor retained oversight. The newest employee was asked to "develop the environmental business in the nuclear and non-nuclear sector." Apparently for the third time, in October 1992, the company was to have "a-go" at the environment.

At the time, the company was organized into three divisions: Nuclear; Oil & Gas; and Power. Each Division retained a manager and line supporting staff, with the overall General Manager acting head of the Oil & Gas Division. Each Division was a separate profit center. The major disciplines and academic backgrounds in the company were science and engineering related, with only the Manager of the Power Division holding a Master of Business Administration. The principal service in Oil & Gas was safety related, design engineering was in Power Division, and environmental and safety located in Nuclear. Desk-top studies dominated the work load. The majority of staff were highly regarded specialists, many were senior project managers. With the exception of the researcher, all professional staff were male.

The parent Swiss company maintained four offices in Britain with a total of 150 staff and a 5 million pound annual turnover. The parent company staff of over 1100 had a 50 million pound turnover. The holding company had a 1500 million pound turnover.

### **10.1.2 Strategic Business Plan Development**

In late 1992, the researcher was asked to address two areas: BS7750 Environmental Management Standard; and devise a business plan for developing the environmental service sector. The researcher felt it was timely and cost effective to integrate the two tasks within a Strategic Business Plan (Plan).<sup>93</sup> Following several meetings between the researcher,

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<sup>93</sup> It is important to note that in mid-1992 the BS7750 standard was just beginning its pilot development in Britain. TQEM was not a common practice, nor a mode of operations that had recognition within the broader industrial sectors. An engineering firm that could integrate the technology oriented background within quality management concepts, i.e. environmental management systems would be a first for a British engineering firm in 1992. This prospect was seen as a market advantage by the researcher.



Scientific Advisor and the Office Manager for the Nuclear Division, the plan was finalized and submitted to all Division heads for comment and discussion. The Plan recommendations were to:

- develop goals;
- prepare and adopt a company policy that provided for a comprehensive environmental operating philosophy compatible with management systems, company growth and stability;
- increase commitment to staff quality and company team development;
- enhance client satisfaction;
- develop operating procedures compatible with company policy; and
- optimize existing clients and inter company associations.

The Plan would be implemented through:

- the Company Policy;
- adoption of a Code of Ethical Practice suitable for engineers and scientists;
- adoption of The Business Charter For Sustainable Development; and
- a program for Staff Quality and Team Development.

The Plan stated that:

...Staff Quality and Team Development are seen as established priorities within the company, the issues identified with this goal are to up-date and expand the staff's general knowledge of the current issues in the environmental field inclusive of systems thinking disciplines. Team cooperation across all Divisions and professional disciplines is promoted to produce quality values and work products.

It made specific recommendations to:

- Expand the company library to include: environmental technology, management and law journals, environmental engineering journals and texts, environmental systems texts and environmental software;
- Give a greater emphasis to communication and training within the company which: allowed time for group meetings; use of meetings to

communicate company projects, use of bulletin boards, use of in-house training programs directed toward innovative pollution prevention within the relevant industry sectors of nuclear, oil and gas, and power;

- Develop a multi-disciplinary task team, that crossed Division functions to act as environmental development support group;
- Allow some non-chargeable time for task teams; and
- Utilize employment practices that seek out team players with interdisciplinary backgrounds, where relevant engineering backgrounds could also be used within environmental sector development.

The document outlined the necessary management support to promote this plan. The plan also clarified the connection to BS7750. It was generally recommended that:

- ...each Division delegate at least one staff member for integrating TQEM operational practices within their Division;
- ...the company structure be reconsidered where efficient and effective integration of company goals is precluded;
- ...establish written practices and operations to satisfy industrial sector quality measurement parameters;
- ...provide incentives to encourage inter-Divisional team work;
- ...provide for quality problem solving techniques; and
- ...optimize existing clients and associates.

Broadening the company's objectives was seen as a way for expansion within individual clients and industrial sectors as well as among associate companies. To differentiate the current engineering capabilities to a broader environmental service base recommendations were made to:

- ...determine how client sectors are/will be impacted by environmental laws, and development agendas from the EC, i.e. eco-auditing and sustainable development;
- ...develop service around regulatory issues...and innovative technologies;
- ...review services with clients; and
- ...provide for speaking engagements, seminars.

Measurement parameters and costs were outlined with an overall profit potential far exceeding early development costs. The Plan was seen as a means to implement BS7750 in the company and at the same time align the company services to integrate environmental services throughout all Divisions.

A key concept that was ingrained within the plan and within the mind-set of the

researcher was based on the BS7750 (1992) definitions of:

- Environment as "the surroundings and conditions in which an organization operates, including living systems (human and other) therein..."; and
- Environmental Effect as "any direct or indirect impingement of the activities, products or services of the organization upon the environment, whether adverse or beneficial" (p. 4).

Along with the other definitions and general environmental management system (EMS) requirements, these definitions emphasize the broader impacts of a company's activities and encourage the development of systems thinking attributes. In the researcher's mind, to implement BS7750 the company would have to interpret the standard's through the individual and within the engineering and scientific research product. How was this to be done? How could this activity generate growth and profit for the company?

In addressing these questions, the researcher attempted to build a shared vision within and between the technical, political and cultural systems in the organization. The standard way of interpreting these system's attributes can be readily seen when reviewing the feedback from the General Manager of the company. He correctly interpreted the Plan as having a broad purpose, broader than he had expected, and intentionally overlapping the principles of TQM and TQEM. The Plan sought to cover political, technical and cultural systems, the importance of cultural factors was the stumbling block, i.e., the environment was perceived as something "out there," and not an intrinsic concern of the company.

The researcher meet with The Oil & Gas, Power and Nuclear Division Managers to explain and clarify the concepts presented in the plan. The lack of commonality between the researcher's vision and Divisional Management's vision of the environment and the Plan, as well as the purpose of BS7750 as a tool for economic growth, was clearly evident. The researcher tried to clarify the purpose of the plan and how it could provide a means to achieve the end of a workload of environmental projects. A "picture of the future" was

presented in which the environmental effects evaluation concepts from BS7750 would be integral to the orientation and work practices of all staff, and that through this integration the environmental projects and thus financial gain would evolve. The environmental projects would not be a "stand-alone" component in the company, but an integral part of an engineering organization that intrinsically addressed environmental issues as an aspect of all projects.

This is hardly a new notion, but it has yet to take effect on a broad scale within the engineering profession. From the perspective of design engineers, environmental benefit can logically take its place as a fourth process design parameter, with a status equal to the current three parameters: performance, profitability, and efficiency. In the most progressive form, management concerned with project development would approach environmental business/engineering development along the lines of the Winter model where six principles would always be considered:

- Quality. A product is of high quality only if it is manufactured in a way and it can be used and disposed of without (or minimizing) environmental damage.
- Creativity. The creativity of the company's workforce is enhanced by working conditions and management structure that support organizational learning.<sup>94</sup>
- Humaneness. The general working atmosphere will be more humane if the company goals and strategies are geared not only toward economics but also toward the sense of responsibility with regards to all forms of human life. This principle is incorporated with the Business Charter for Sustainable Development.
- Profitability. The company's profitability can be enhanced by increasing environmental innovations within engineering and scientific disciplines and projects.
- Continuity. With the engineering and scientific capabilities of the company, incorporating best practices to minimize environmental concerns, the client sector benefits from partnering with the company.

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<sup>94</sup> This principle is modified from the Winter model where conditions are aligned with respecting human biological needs. In the researcher's view the organizational learning would encompass these aspects and the individuals would build this structure to support their creativity.

- Environmental consequences of company operations will be evaluated to minimize client liability.
- Loyalty. Ultimately, the staff of a company will be loyal to their company only if they are in some way attached to it. Company management that promotes learning disciplines see their staff develop personally and professionally. Individual motivation and energies are better spent promoting a common goal (The Elmwood Institute/modified, 1990).

Considering the definitions within BS7750, to fully embrace the scope of the standard would require some structure similar to the modified Winter principles.

After some delay following the first meetings, the plan received more feedback on the proposed company approach to BS7750. How was this to be interpreted at the company? The Plan's proposal was again explained as an integration of environmental thinking across Divisional lines; that all engineers would gain knowledge of their work's impact on the environment. In this way, all project managers would in effect be "environmental managers" and intrinsically link environmental components into their client needs. The concept was based on providing environmental engineering in-house training within mechanical, civil, electrical, structural disciplines. The environmental effect of the company would be linked to the engineering and scientific work product.

The question then became: How would this be assessed? Would, for example, a project manager propose to a client a non-solicited evaluation of the environmental impact of designs or application of a project? Would the company turn down a project where environmental effects were not considered? How could environmental effects and their evaluation be judged? What criteria would be used? In short—the questions raised a dilemma in the minds of the divisional managers of the Company, as well as the researcher. The systems perspective was not easy to grasp.

Numerous explanations and interpretations were discussed throughout a follow-up two month period. Interpretations were provided by the researcher along the lines of

environmental engineering starting with the basics of the environmental benefits associated with environmental engineering topics: control and prevention of water, soil, noise and air pollution; proper elimination, treatment, or disposal of wastewater and solid and hazardous wastes; and provision of safe public and private water supplies. Because of the engineering orientation of the company overall, these issues were closely aligned with pollution prevention engineering where engineering controls are used to prevent or minimize any waste.

Traditionally the orientation of engineering consultants is towards well-defined projects which result in closure without unresolved issues. This seems to be an appropriate attitude for straight engineering, where for example the project is a power station or bridge delivered in working order. Once the environmental dimension is introduced however, projects become more open ended, since recommendations would include phrases like "should be continuously monitored," "may need to be modified in the light of results from environmental monitoring," "may need to be considered when new prototype technologies become commercially available." In the view of the researcher, the responsible consultant should inform the client of the limitations and constraints of the work and should identify how it could be improved. This is not always welcomed, since a formal record then exists that the "best" of all possible worlds has not been achieved.

The process taken whereby a company would take action to inform the client of limitations, begins with having a company culture that moves beyond the thinking of only exploiting potential clients in an existing market. Companies with this existing market mindset can be characterized as chameleons that merge with the identity of clients, delivering what they believe the clients want, rather than setting up themselves up as a world-leader in selected areas informing clients of both their needs and how they can be satisfied.

The next concept that was introduced was the impact of engineering and research on the broader community. Being cognizant of the broader community impact provides the company the ability to "partner" with clients beyond the single project. Another issue, was directed toward environmental technologies, by providing continuing in-house training to engineers, their knowledge of current technological developments would likely increase client satisfaction and designate the company as proactive in environmental as well as general technology development implementation. And finally, the environment would not be a stand-alone department, it would be integrated. Engineers would incorporate environmental benefit within designs, and a specialist support staff (initially hired on a per project basis) would be used as technical back-up.

For several months, the researcher made little advance in converting the company mental image of what "the environment" was and how it impacted the company. The management viewed the researcher's difficulty as not understanding her task, which was again described as "go out and get environmental work." As far as BS7750 was concerned, the company expected only a recycling paper program. The Plan's means to the end of getting environmental work through leveraging integration of the environment within the engineering disciplines was not accepted and the activities were generally seen as an infringement on Divisional management territory.

The research reveals that the mental-model that had developed in the company over the years, clearly pinpointed the environment as something outside their consulting engineering "normal" work product. Any attempt to integrate the environmental dimensions within the established hierarchy proved, for the most part, fruitless. Since inception the company management had developed a mind-set of "the environment" outside the engineering disciplines. Resistance to change by training and increased information exchange

to accommodate a broader perspective would require something more from the researcher. It is clear that adding environmental benefit to the engineering profession will need particular nurturing both within the company and by outside professional organizations in Britain.<sup>95</sup>

These issues proved difficult to bridge, the hierarchy within the company that had developed over the years clearly indicated an authoritarian organization with clear lines of responsibility and dedicated profit centers. Inter-Divisional competition was clear with each manager building up their lines of responsibility. Any concepts implying inter-Divisional activities were met with resistance. Senge (1990) notes this type of political/power resistance, and warns those looking for a learning organization of such road-blocks.

The researcher ultimately dropped the initiation of Plan. Seeds planted during the

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<sup>95</sup> Outside organizational influence has come to light in the United States and in discussing the advantage to consulting engineers, environmental benefit is considered to provide leverage for international competition and for the engineer's employment. Professional engineers (those that have not specialized in Environmental Engineering under their baccalaureate/masters degree) may complement their particular discipline with environmental problem solving by application to the American Academy of Environmental Engineers. Established engineers must meet minimum qualifications: A baccalaureate degree in engineering or related field; a professional engineering license; eight years of practical experience, successful completion of a written examination. The specialty exam may include: air pollution control; general environmental; industrial hygiene; radiation protection; solid waste management; water supply and waste water; and hazardous waste management (Anderson, P.E., Executive Director of the American Academy of Environmental Engineers, 1992).

There is an inertia to overcome when working against the necessary changes in design thinking, but the researcher sees this capability as enhancing competitiveness. Environmental technologies diffusion through the engineering profession will lead to economic growth as environmental considerations become more pressing. It is probable that there will be a major global market for such engineers (Anderson, 1992). Conventional technology and established disciplines boundaries at the company represented a 'comfort zone' for management and delving into other systems represented a risk, that at the time, no one was willing to take.

Competitiveness considerations do not stand outside political issues, and there are particular regulatory initiatives that would also promote broader perspectives on engineering disciplines in Britain. Government actions include information transfer, training, technical assistance, performance standards, economic incentives and the qualification of experts. Of particular relevance to Britain at the time, would be a greater reliance on performance standards which would encourage innovation. Technology-based rules tend to discourage innovation and often build in unnecessary costs. The government might also look at a greater use of indirect incentives (tax credits, etc.) and direct incentives (grants). These two means of environmental protection would send an encouraging message to engineers to incorporate a broader perspective into design (this issue was specifically discussed in the context of the consulting engineering profession by Dr. Milton Russell, Chairman University of Tennessee and Professor Nicholas Robinson at the Center for Environmental Legal Studies at Pace University School of Law, at the American Academy of Environmental Engineers Conference in 1989).



interlude eventually bore some fruit in the form of TQM proposals repeating the call for concepts presented in the Plan and probing questions wanting to operationalize TQM beyond the paper exercise required for certification.

The implementation of TQM within the company in late 1993 indicated the same problems associated with the company structure which served as road-blocks to the Plan. The following comments were made in an internal memo from the TQM implementation staff to the General Manager:

In order to preach the gospel of TQM to potential clients it would be advantageous if we could also demonstrate that the company embraces the philosophy of continuous improvement throughout the organization by the dedication and involvement of management and employees....key questions that need to be asked are what are the (company) goals...it is probably by the profit and loss account. If this is so, is this sufficient information to identify the areas requiring improvement in the organization? I think it is probably inadequate. We should develop tools and documentation to enable system enhancement. Is education required?

The researcher suggests that the answer must be yes! At this time it was identified that neither quality nor the environment could be measured solely by financial profit and loss goals.

Research shows that implementing strategies for the environment as well as for quality require organizational learning, a management closed to such a commitment is unlikely to realize either the financial or full quality benefits from the exercise of BS7750 and/or BS5750. By using an indirect approach, a second fruit from the researcher's practice was realized with implications for the entire organization. By enrolling receptive individuals to the idea of cross-divisional environmental support, a modification in company structure was realized in August 1993. The researcher moved to the Power Division, with the recognition that the environmental service would cross Divisional lines—a first for the company. The "environment," however, remained with the researcher alone and the concept

of integrating environmental activities within engineering disciplines was not realized up to the time the researcher left the company at the end of the year.

The points of general importance shown by this case are that different parties have different visions of "the environment" and its impact on technology, scientific research, competitiveness and management. These differences must be understood prior to development of work products required for goal development, economic gain and employee efficiency. While the impact on economic growth from developing the knowledge and environmental engineering skills of the staff cannot readily be projected, there is every indication that a well-established environmentally integrated consulting engineering firm within the Oil & Gas, Power and Nuclear sector could be well placed to capture a good market share of integrated environmental work.

The researcher made a critical error in not recognizing the relevance of the recent breaking of the business into small Divisions, resulting in a decentralization that created short-term task-oriented managers. At the administrative level, each manager was driven by a local, short-term bottom line. Thus, a plan aimed at an integration of the company's people hardly fit the management scenario. Devising a plan around core values and a mission involving the stewardship of individuals was inappropriate where no central responsibility, management function, or operating principle could be found. The structure of the company failed to take account of the interdependencies by which Divisional actions affected not only their local sphere of influence but the broader sphere of markets. Vision sharing was not evident!

This case shows that while standard setting such as BS7750 is innovative and progressive, the inherent problems with the political and cultural systems within a business greatly impact how, to what extent and under what criteria the EMS is actually developed.

In this case the researcher's vision of the standard was that it should be realized through integration within engineering disciplines and economic growth, whereas another vision was held by the overall management of the company.

Another example can be used to illustrate the differences of perception on the issues raised. In a management solicited report "Wastes Arising at (the company) and Relationships to BS7750." the report indicated that "paper is the major resource consumed and reprocessed by the premise...reports are the main product of the premise activities...." In that regard, it was recommended that reports be double-sided and that recycling bins be placed around the office.

Following review of this report by the researcher and the ensuing memo's on the subject matter, the researcher prepared a reply to the report which discussed the perception and vision issue.

...If we return to the purpose of BS7750, exactly how is (the company) primarily positioned to impact the environment? Is it principally through an exercise of the (paper issues and insulation in the offices) or through integrating environmental "thinking" within all disciplines represented in the company? Wouldn't a structural or safety engineer that integrates pollution prevention into designs/studies impact the environment in a significant—and economically productive—sense more than the same person thinking of the environment and his/her responsibility to it in limited terms of cavity wall insulation in the office? It is not that the issues in (the report) are not an element of BS7750—I believe they are—but are they the issues that an engineering consultant should prioritize and are they the issues that will best translate into profits for the company?

This case clearly shows the vision impact on the implementation parameters of BS7750. It might be surmised that the early definitions of environmental interpretations associated with recycling, for example, have disabled the creative energies of society to think beyond the typical response. In a reply to the report, the researcher pointed out that:

...this discussion does not do justice to the knowledge and foresight that is represented in the Environmental Section of this company...and I would not like to think that the rest of the company would perceive the

'environment' within these limited terms.

It is difficult to differentiate what impact the cultural attributes, discipline training, and the fabric of political relationships had on this case. Undoubtedly, each contributed to the scenario, the threat to traditional norms and ways of doing things in the company was clearly evident. This case clearly shows (at a minimum), however, that learning within the organization is crucial to developing mental models, most importantly some common picture of what is the environment and how it can be impacted by business unit operations. Learning at this basic level must precede any action directed toward an environment-business integration. The environmental professional acting on elements of CEDM without utilizing the reinforcement and balancing capabilities of policy and company stakeholders operates under a substantial handicap when implementation becomes the issue.

The premise is simple—how can, for example, an EMS be implemented if there is no consensus on the nature of the environment. If this is combined with a situation in which there is no management "obligation" to economic development/growth nor participative involvement in environmental quality initiatives then it is no surprise that an EMS would have little chance of surviving.

The research setting did not provide opportunities for incorporation of government directed policy attributes. The lack of stakeholder influences that could be used to promote the researcher's approach severely hampered the activity. The case indicates the importance of having all paradigm elements in place to act as reinforcement and balancing systems. The findings of the case also indicate that the researcher herself was in the early stages of learning CEDM and that learning can be advanced in distinct stages as new insights are gained. Similar remarks apply to EMS-related learning.

As one of the first pilot EMS schemes developed in Britain, this case points out

critical learning avenues that must be advanced along with EMS standardization procedures. By 1994, environmental journals in Britain had identified the importance of training requirements and professional groups have since established training criteria. As an example, EARA training states that a generic syllabus for foundation training courses should include: EMS standards and audit protocols, environmental processes and effects, relevance of regulations and documentation, environmental monitoring and mitigation. This EARA training would be categorized as traditional EMS environmental professional training, as discussed later in this chapter. Through 1995 the Institute of Environmental Management (IEM) in Britain had confirmed that environmental managers displayed a sound grasp of technical and legal issues but most have a poor understanding of what is sustainable development (Ends Report, September, 1995).

In mid 1996, when the researcher spoke at an International Environmental Law Seminar in Horsley, England, conversations with environmental lawyers from Britain and the Continent did little to suggest that sustainable development understanding had improved (at strategic decision making levels) at the environmental professional, or indeed, the legal community level. These areas clearly need to be addressed through further learning-related activities in the context of the CEDM paradigm.

In its limited success, this case reinforces the importance of defining CEDM, the criticality of a fundamental consensus as to the paradigm elements, and the selectivity of corporate and society cultures in adapting the paradigm for application by professionals in the field.

This case does not provide concrete applications of CEDM. However, it is not logical to expect this at the first stage of the learning. Whereas the theory that underlies CEDM practices may be valid, the ability to influence behavior may not be developed at early stages

of development of a professionals understanding of the CEDM paradigm.

## 10.2 CEDM EVOLUTION

CEDM evolution centers around a professional's enlightenment developed through training. Education of environmental professionals stretches the professional disciplines and utilizes the EMS as the infrastructure that can ultimately support CEDM.

The status of CEDM learning in 1992/93 could be advanced through reflection on actions, values and operating assumptions. Seeking a continuance in the researcher's and other's learning, a training program was developed. Progress in realizing the paradigm was sought through the development of a "professional's" training program that moved beyond the commonplace single tradition training most often afforded environmental professionals. The training serves as a bridge to the sciences and humanities as well as management and economics. The environmental professional's training program, developed by the researcher, integrates systems thinking management principles, quality management, economics and the environmental sciences. The program does not strictly provide the applications themselves. The EMS and the ISO series of international environmental standards served as timely integrative factors capturing the attention of business in the United States.

The EMS embodies CEDM attributes and provides a context for applications. Attributes formalize the guiding ideas and theory. The EMS is not suggested as the only approach to CEDM but its timely introduction within management circles can be used to the benefit of CEDM development. The three aspects that favored selection of the EMS for CEDM development by the researcher were an intention to resolve the problems found and illustrated through the first case study, a desire to capitalize on a current innovative infrastructure in the business community, and a wish to make use of experiences gained during the research period. The training program, A Quality Systems Approach to

Environmental Management, was completed in December, 1995. A segment of the training introduction characterizes the position of the training agenda:

"The 1990s represents a period during which organizational development and a new sort of management development are connected. The new management will focus on the roles, skills, and tools associated with a new kind of territory: a big picture approach to business. It means seeing and understanding the dynamic complexity which arises between the organization as a whole; its products, processes, services, and activities. For the environment, this means seeing the environmental interrelationships... Environmental Management Systems present an environmental stewardship commitment that is emerging as one of the most visible and challenging management imperatives of the 1990s. (Takaki, #1, 1996 p. 3 & 14)

The cornerstone of CEDM is presented within the training program in Module II How To Put Ideas Into Practice: Principles and Practices of Systems Thinking. Under a subsection titled "For Those in the Corporate World - Why Bother?" the text reflects a central CEDM dilemma in answering the question:

Ambiguity and confusion of values characterize the later part of the twentieth century. To put an idea "EMS" into practice requires, at least to some degree, a coming together of an environmental consciousness... ..Perhaps no other profession is more aware of systematic breakdowns and a lack of systems understanding than those involved in the environmental profession. No other profession is more aware of the needs for new learning and systems skills and capabilities than those involved in the environmental profession. Faced with the complexity of air resources, solid waste, water management, ecological impact and risk evaluations; the requirements of understanding problems and finding solutions within the industrial and regulatory network, and all this under the watchful eye of an increasing array of value diverse stakeholders sets the environmental professional in a special position for a systems approach...(p. 5)

Answering these questions, within the training text: "How do you enable yourself and the people in your organization to manage the change that will be necessary?" "How do you get results?" "How do you create and clarify a common purpose and identify key areas for strategic environmental focus?" the guiding principles of CEDM are presented to the professional. In short: "How do you change yourself and the organization from a viewpoint

of the environment as a compliance issue to one of commitment?" is addressed. From the historical perspective the training looks to the Tragedy of the Commons which reinforces the importance of the CEDM paradigm attributes and through the efforts of the learning organization reinforces strategies for dealing with economic growth and environmental quality. A broad view of the EMS is taken and its position as a means to develop a unified business position to influence the public policy process is established.

The training covers environmental performance through environmental leadership with ideas focusing on the widening array of possibilities and choices available to professionals, and through management which focuses on understanding, planning and organizing, implementing, and control to achieve significant improvements in environmental performance. Aspects of the CEDM paradigm are emphasized in the guiding ideas associated with strategic environmental management (stakeholder expectations), public policy and regulation (natural resource laws (NEPA) and pollution control laws), sustainable development, and standards and guidelines (as an expression of policy and planning).

Through 1996, this training has been provided to representatives from the Canadian Government, Motorola, and Department of Energy as well as numerous independent environmental professionals and lawyers from the United States, Chile, and Kuwait. The learning approach was presented to organizations such as Deloitte and Touche, a global semiconductor firm, Motorola, and several large utilities in the United States. The feedback from Deloitte & Touche noted the program's departure from the more traditional EMS/ISO14000 programs, and touched upon its uniqueness with a statement that: "This program is different from 95% of the programs out there" (Erik Gilberg, 1995). Deloitte & Touche continues to add support to the training style and overall contents through their position on an Advisory Council. Motorola described the program as leading edge in



changing a professional's paradigm; a much needed exercise in corporate America (Ron Clot, International Director of External Issues Sector, Environmental, Health and Safety Semiconductor Products Sector, 1995). A presentation of the concepts at Arizona Public Service (APS), an Arizona Utility, received comments on its unique approach and vision into corporate leadership and environmental understanding (Bill Wiley, APS Environment, Health and Safety Government Affairs and Corporate Relations, 1996).

Along with professional training, a professional certification body was sought to develop a certification process acknowledging the professional with an increased understanding of CEDM and environmental management systems theory, methods and tools. The Certified Environmental Quality Administrator (CEQA) qualification, was developed by the researcher through The National Registry of Environmental Professionals in 1994 and 1995. This certification is just beginning to be acknowledged within professional circles.

In its final form, the certification does not require the professional to have achieved the full measure of learning associated with CEDM. Compromises and varying degrees of tolerance for change within the professional certification community resulted in more focus on ISO14000 than the intent and structure of EMS implementation characteristics. This reflects the strong emphasis on compliance in the United States, whereby professionals are asked to follow rather than become leaders in innovative solutions and decision making. This certification does however, show a development in professional registration and is an accomplishment attributable to the CEDM paradigm.

The traditional training programs on the EMS/ISO14000 subject matter generally cover: background on the ISO process and the genesis of ISO14000; potential impacts on industry, how to interpret and implement each element of ISO14001 and how third-party auditors are expected to interpret the requirements of ISO14001. This agenda from the

ASTM Technical and Professional Training (1996) with various approaches to the same themes presented by numerous training organizations are available throughout the United States and Europe. This type of training along with the catalogue of environmental regulation courses comprises the environmental professional's usual continuing education in the United States.

The traditional professional certifications are most closely associated with regulatory compliance. As an example, The National Registry of Environmental Professionals states that their highest certification is the Registered Environmental Manager (REM). A review of the test shows 90% of its questions are based on regulatory compliance.

Traditional professional certification procedures related to EMS and ISO14000 are also moving through international registration bodies. These certifications, including the EARA programs described earlier, in their totality focus on auditor qualifications and/or EMS internal structure.

Lying outside traditional training agendas, one of the researcher's in-house training programs and follow-on EMS facilitation provides the setting for the second case study on CEDM learning. The study illustrates the potential and usefulness of CEDM as a way of seeing EMS in the context of an integrative paradigm. At this stage of CEDM evolution, concrete applications begin to clarify some aspects of the paradigm and applications can be expected in vision processes, practicing new assumptions and insights, and making critical choices.<sup>96</sup>

### **10.3 CASE STUDY - CEDM LEARNING 1996**

The goal is to help you develop professionally as a leader and manager in business and environmental strategies. The principles and practices

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<sup>96</sup> Arthur D. Little research (1995) shows that 78% of the time it is the environmental professional within the company that is called on to implement an EMS. Without the broader education needed "beyond compliance" language is unfamiliar and confusing to the majority of professionals.

of EMS learned here will help clarify the company's vision and strategic response to: integrating environmental considerations into business strategy (Takaki, #4, 1996 p 1).

### **10.3.1 Case Study Setting**

Western Area Power Administration (Western) is a division of the United States Department of Energy (DoE). In 1995 the organization sold more than 34 billion kilowatthours of energy or enough to serve nearly 4.2 million households for a year. Their primary energy sources are the 55 hydropower plants operated by the United States Bureau of Reclamation. Western's service area covers 1.3M square miles in 15 states. Power is sold to 596 wholesale power customers including 287 municipalities, 46 cooperatives, 15 public utilities, 55 irrigation districts, 58 Federal agencies and 55 state agencies, 6 investor-owned utilities, and 73 project use customers. Western operates and maintains an extensive, integrated and complex high-voltage power transmission system.

Although Western is a part of the DoE, it is separately managed and financed. In 1995 Western generated \$797 million in gross operating revenue. 1995-96 saw a restructuring in Western's organization and management strategy, with its directive taken from the benchmark of private industry to operate to the best interests of all its stakeholders, cut costs, provide a quality service and be competitive in the recently deregulated energy sector in the United States. The Energy Policy Act passed in 1992 states that its purpose is to encourage more efficient use of energy and water by improving conservation/energy efficiency in homes, offices, federal buildings, appliances, water fixtures, energy consuming industries and electric and gas utilities. Title XXII of the Act addresses energy and economic growth as a DoE criterion with additional provisions addressing the continued mitigation of environmental impact associated with energy generation. Pollution prevention is addressed in the Act under the improvement of energy efficiency and cost effectiveness.

be completed by the end of FY 1998. The Vision of Western's business strategy is:

Western will meet the challenges of the changing industry through:

- quality, customer-focused service
- competitive pricing
- excellent business practices
  - efficient, flexible, well-trained workforce
  - optimal resource use
  - streamlined processes and organization
  - strategic partnering
  - good stewardship and citizenship.

The Mission of Western reflects business interests:

Western markets and transmits reliable, low-cost electric power, provides services and encourages efficient energy management in an environmentally-sound manner.

In early 1996, Western was given a Order from DoE to implement an EMS, The task was eventually delegated to a group of environmental professionals representing the five Western Regions. Several convergent challenges face the EMS team:

- Design and implementation of an EMS that is fully integrated within Western's operations.
- Upgrade the overall status of all the environmental professionals in the utility to respond positively to the restructuring.
- Provide upper management with a better understanding of the EMS and how it promotes economic growth.
- Transform the way Western basically deals with environmental issues.

The task of implementing an EMS was given to a task leader in March, 1996. The EMS team was chosen by the task leader. The general academic background of the six man group includes all having Bachelor degrees in the environmental sciences. Average years in the environmental profession is approximately 15. Ages range from mid thirties to mid fifties. All were compliance-oriented to both NEPA and the pollution control laws. All of the

personnel at Western were in the process of going through a five day training program provided by the Stephen Covey (author of the Seven Habits of Highly Successful People) Center. (This additional training is seen as a reinforcement of systems thinking which is also a component of the CEDM paradigm.)

### **10.3.2 The Professional's Approach to EMS**

The group began their activities in a way that can be characterized as a group of "environmental guys sitting around a table" trying to figure out what to do. Eventually the team came across the ISO14001 standard and began an activity of reading through the literature. The team began listing the current environmental programs they had in place with cross references to what was required in the standard. The approach could be characterized as "compliance minded" in nature with little or no thought given to a different viewpoint on performing the task at hand. This attempt can be considered a before snapshot of the EMS mind set.

The team leader called the researcher in May, 1996 and began a dialogue on EMS. This was directed to the framing of an EMS focused on a different perspective oriented on the economic aspects and environmental quality. This first conversation opened up possible new avenues to pursue. Being unsure of the ideas presented a video conference among the team was called and the researcher presented the EMS in its historical perspective, the possible results of the different avenues (compliance-minded vs commitment-minded) of EMS development, and the modes of thought and operations supporting each direction. (These directions are not mutually exclusive, but each does imply a distinct view point and value orientation of the program designers.)

The compliance-minded approach was presented as being akin to using the ISO standard as a checklist. The key principles are focused around the quality program cycle of

plan, implement, check and review. Compliance-minded requires the continual burden of motivating and manipulating people. This approach is similar to the earlier quality programs that focused on documentation but simultaneously are described as leaving the people behind. According to Arthur D. Little's, J. Ladd Greeno, and Erik Gilberg (1995) these programs constitute approximately 95% of the current ISO14001 training agendas where the actual EMS intent has almost become lost in the zeal to "follow the standard."

Commitment-minded was presented as being akin to a creative problem-solving process. The key principles evolve from accepting learning as an EMS foundation. The person develops along with a path of commitment, innovation and responsibility to make the EMS happen. This committed individual becomes the source of the principles and practices required for effective and efficient organization and environmental strategy. Finally the EMS is presented as a change in environmental consciousness, management, relationships to society, budgets, design of processes, opportunities and constraints, standards, and policy and regulation. The EMS is associated with, for example, environmental stewardship and sustainable development goals. The EMS in this context does not exclude an ISO element but this is now perceived as the minimum in requirements.

Commitment to the whole is described in the learning organization literature as "always to something larger than ourselves, guided by a sincere desire to serve the world." This is a very important orientation since it has great power (Senge, 1990, p. 171). Commitment as the driving force is recognized in strategic and quality management as the central most critical element is achieving learning and leadership positions. Commitment in the environment field is recognized as moving beyond compliance. To clarify what "beyond" means, this research looks to the guiding ideas of CEDM. In both the management and environment cases, commitment is the core process through which people are motivated to

develop their visions, purposes and values.

Comparisons of the compliance-minded and commitment-minded approaches show that many of the activities are similar or related. However, the central premise is that the point of entry for compliance is most often the standard, the point of entry for commitment is a system, systemic structures and actions within these structures. In a commitment mind set an attitude is developed which lies beyond the boundaries of standardized strategies, i.e. compliance-and-beyond. EMS viewed as an innovative structure in business is presented as a resource whereby the professional can instigate change and make better decisions that affect the present and future quality of the environment.

Given the options, the team chose to adopt a commitment approach to EMS at Western. The researcher was retained to customize the concepts to Western, provide training and assist Western in early EMS policy, planning and implementation.

### **10.3.3 EMS Training and Facilitation to Develop the Principles and Practices of the CEDM Paradigm**

Professional training as learning is presented in the management and environment literature as the key element of cultural change. Training is used to articulate the guiding ideas of CEDM as well as the theory, methods and tools. The EMS is presented as the vehicle by which the professional can practice and participate in the evolution of professional ethics in the workplace.

The training program, A Quality Systems Approach to Environmental Management, was organized around a conceptual system focusing on Western's systems and management. The generalizations of the paradigm are incorporated into theory, methods and tools at the level of the learning organization so as to incorporate systems thinking, the intent of policy, and the integration of stakeholders. The beliefs of the paradigm were formulated in terms of

perceptions, information and operations of or on the environment closely linked to NEPA and pollution prevention policy instruments. The values were articulated throughout the program, concentrating on the professional's obligation to have a positive impact on both the environment and economic growth.

Progress can be determined by both internal and external observation because the EMS has a critical requirement to become an integrated aspect of the overall organization, therefore external standards outside the environmental community can be used to determine progress. A CEDM guided EMS provides a conceptual system that is based around theory where successes can be predicted based on particular criteria afforded the paradigm through (at its most basic level) the use of policy instruments, rational ecology and systems thinking. The solutions can reflect the attributes of CEDM through the view point of both professional and academic principles. Solutions may change as other professionals begin to share in the theories and develop methods and tools from their own experiences.

Western's EMS Team training was conducted over a three day period in September, 1996. The researcher used the primary training text materials supplemented by Western's own corporate documents. Facilitation exercises were carried out at two separate meetings, covering three days where the EMS Plan was developed, and during their annual environmental seminar, held over a four day period. Telephone and on-line transmissions were continually used during the EMS development period.

The legitimate environmental decision making solutions found through the EMS case study at Western provides early indications of the possibilities for the CEDM paradigm.

#### **10.3.4 Training and Facilitation Directions and EMS Incorporation of CEDM Practices**

Practices, albeit in their evolutionary form, can be looked to as evidence of the vitality



of CEDM. Neither the CEDM paradigm nor the commitment mind-set are natural to the environmental professional at this point in time, therefore an ongoing effort is needed to maintain the momentum to continually create and refine CEDM's problem-solving capabilities. The degree of resistance to change is greatly influenced by corporate structure, attitude to innovation, as well as the policy boundaries existing between environmental disciplines.

Environmental professionals are struggling with values, leadership and the need to adapt to change associated with the EMS understanding of the environment and how and where it fits into the overall strategy of the firm. The hallmark of a healthy paradigm is evidenced by the role of environmental stewards that has been taken on by professionals in the firm.

Western's experience covers a four month period. Progress with the CEDM paradigm elements can be visualized and evaluated through an examination of their EMS activities. The accomplishments resulting from the reordering of priorities is presented below.

#### **10.3.4a Values such as that:**

- **The environmental professional has an obligation not to do harm.**

#### **Training Theory and Procedures:**

A better understanding of values is presented in the context of the EMS leadership function beginning with the evolution of guiding ideas about vision. Vision moves through personal growth, the systems thinking discipline for seeing wholes, and on into the changes associated with EMS. The EMS vision is presented as the central leverage point to achieve meaningful results. Vision is the cornerstone for professional effectiveness. Self-image of the environmental professional (at the most basic level) is centered around what it means to bear an obligation not to do harm. EMS impact revolves around personal pursuits, community

impact and professional purpose. From that point the follow-on values, purposes and goals of the professional and organizational EMS evolve.

### **Western's Application of Value Principles:**

"Good stewardship and citizenship," stated in the Western's Corporate Vision was further articulated through an obligation not to do harm identified as environmental stewardship. Stewardship implies these commitments:

- To integrate environmental concerns with operational, financial, safety, health, economic development and other relevant concerns in decision making.
- To meet or exceed the letter and spirit of Federal laws, and, where appropriate, to be compatible with state and local regulations, and international standards.
- To improve the level of awareness throughout Western of the environmental and health benefits and risks of operational decisions and to encourage and recognize employee actions resulting in environmental improvement or the avoidance of environmental damage.
- To apply environmentally responsible management practices to hazardous materials used in operations, including biological products, specifically with regard to the acquisition, handling, storage, safety in use, transportation and disposal of such substances.
- To ensure that environmental considerations are integrated into Western's purchasing policies and practices.
- To seek cost-effective ways of reducing the input of raw materials, toxic substances, energy, water and other resources, and of reducing the generation of waste and noise associated with day-to-day operations.
- To acquire, manage and dispose of lands in a manner that is environmentally sound including the protection of ecologically significant areas.

A Leadership Commitment Statement developed by the team reads:

The Western Area Power Administration (Western) has embarked on a transformation plan that embraces a process of improvement and a quality focused customer service.

Quality, like our environmental stewardship, applies to everything we do. Boundaries do not exist, quality is never compromised and excellence is continually sought. Environmental stewardship is a business decision and we see our environmental performance as a valued condition for our economic growth.

Western is distinguished by its people, its organizational relationships,

its renewable energy resource base (hydropower), and its customer. The synergy and balance Western creates between these resources, along with Western's economic welfare in relation to the quality of the environment represent the true measure of Western's success in the utility industry. Western is faced with many environmental challenges and opportunities. To address these, Western's Mission includes commitment to good business and accountability to the highest standard of environmental performance. Western's environmental efforts, evidenced by our commitment to good environmental stewardship, are an investment in our future.

The EMS vision is based on what the team wants Western to be and to do and the values upon which action will be based. This vision is meant to be a living document.

The future will be a result of our plans and efforts. The future is an integration of business and environmental strategies that address the realities of where we are today and where we want to go. The vision embodies the past and the future and reflects: 1) an environmental ethic of sustainable development associated with the intent of the National Environmental Policy Act of 1969; 2) operational and risk related strategies associated with the Pollution Prevention Act of 1990; and 3) energy provisions as outlined in the Energy Policy Act of 1992. As public policy mandates, these acts give our strategy a substantive process perspective, key reference points, and help in our understanding of environmental stewardship.

Good business sense does not neglect environmental stewardship and is guided by strong leadership support. Improved information and communications between all stakeholders is seen as a direct resource that can be used to sustain our position and provide avenues for growth within the market of our business areas. Policy, practices and procedures along with monitoring and corrective actions document and verify our functional strategies.

Our vision includes an increase in our problem-solving capabilities which will result in increased understanding and competency in several critical areas. These are risk and liability, fostering teams and partnerships, and environmental economics. By integrating our basic environmental principles in all operations and practices we will translate our vision into action. Coherence and energy within our total organization is of enormous importance to our business success and self preservation.

With excellent environmental leadership and management strategies, Western's environmental vision will continue to advance its reputation, enhance operations, assist in sustaining and acquiring new market niches, and improve its competitive position. Strategies to effectively use

resources and meet the market expectations of environmental stewardship link Western's EMS vision to the broader strategic plan for Western.

These statements reflect the training orientation of values and direct the EMS process for Western. As a comparison that the training provided a better decision making value orientation structure this environmental policy statement was prepared prior to the training.

Western will conduct its business in an environmentally sound manner, efficiently and effectively complying with the letter, spirit, and intent of applicable environmental statutes, regulations, and standards. As stated in our core values "We believe in protecting and enhancing the environment and that these investments are sound business practices."

Western will use effective planning to eliminate, lessen, or mitigate the environmental impact of its actions. Western's goal is to enhance the environment through cleanups, pollution prevention, and waste minimization.

This statement was clearly made from a compliance mind-set and actually limited the constructive development of the EMS statements developed after the training. In the EMS Plan, Western's team described this policy statement as providing early "directions and some initial goals, helping to get the EMS implementation process started. Seen as an early guide for managers and team members alike, policy refinement and clarification is considered inherent to the EMS process" (Environmental Management System, EMS Plan. September 15, 1996).

The presentation of these EMS Planning Statements at Western's 3rd Environmental Conference drew both criticism and support from the larger environmental group at Western (approximately 55 people). The researcher along the EMS Team Leader spoke at the conference to generally solicit support for the Plan. The presentation focused on the broader picture of EMS, providing information similar to that presented during the training given to the core EMS implementation team. The consensus of the environmental professionals and

upper management at the close of the conference was support for the EMS Plan.

Senior management at the conference (with no prior training) focused on the following issue: environmental criteria associated with Western's environmental stewardship and Western's process analysis developing under the EMS Plan. It was noted that a nationwide group from the utility industry was working on this task. Further discussion on this issued opened up the advantages of using rational ecology criteria. This discussion opened up an awareness to this paradigm element that was heretofore unknown.

**10.3.4b      Generalizations emphasizing that:**

- **Rational ethics and systems thinking can provide the guidelines for human conduct.**
- **Government policy, based on sound science, can impact morality.**
- **Citizens have a key role in decision making.**

**Training Theory and Procedures:**

These generalizations support the framework for knowledge of how to put ideas into practice, without which the EMS never reaches its potential. Training follows a pathway of understanding and covers the competencies that will lead to effective EMS strategies. These strategies see the attributes of the learning organization as a central requirement for implementation. These attributes develop from a professional's ethics and systems thinking.

If the professional is asked to move from the predominant paradigm, an alternative theory and its tools and methods must be made known and understood as a model for improved decision making. Training outlines how systems thinking is used to address problems, map possible fixes, understand impacts, identify fundamental solutions and possible side-effects, find interconnections and identify high-leverage actions. The training includes

active group work which asks professionals to prepare a picture of their EMS, the reinforcing processes, balancing processes and organizational delays. The findings ultimately create the guidelines for the EMS process. The systems learning strengthens the abilities of the professional to understand reinforcing and balancing feedbacks critical in rational ecology actions and in management structures.

The inability of people to understand the complexities of systems in operation is a central focus of the training. The fundamental concepts of systems are introduced in the context of strategic environmental management, leading with stakeholder analysis and following through to risk assessment; public policy and regulation (incorporating NEPA and pollution prevention) looking at the system of environmental laws, compliance, liabilities, enforcement, sustainable development; and standards and guidelines, using ISO14001 as a framework.

The professional's value orientation, not to do harm, is best realized through the preponderance of the total actions of the organization. Therefore an appropriate expression of professional ethics is the professional's realization that only through operating principles which are associated with integrating the CEDM paradigm elements into the whole of decision making can harm be minimized and possibly prevented. Ethical concern is addressed through the professional's integration of the EMS throughout the whole of a system, to improve the chances of implementation of good decisions. The ethic of not doing harm linked to regulatory compliance motivations is also presented through the training. In a sense, an individual's ethics beginning with an orientation not to do harm can only be realized by giving up individual responsibility and transferring responsibility to the organization as a whole.

The moral and ethical aspects of policy overlap with sound science underlying the

substantive nature of policy and regulation. The requirement for sound science reflects the move in policy evolution at the EPA that challenges the old models of air, water and waste management. Foundations for new models must move from the old system of decision making and provide avenues for new decision making. The training is clear about the new foundations which will support policy, albeit a good deal less tidy and controllable than the rigid compliance system it is replacing, it is nevertheless a better basis for operations for the future. Models will be system based, with environmental performance moving beyond compliance to incorporate the interests of stakeholders.

Morality, led by policy, is increasingly a requirement in the United States where environmental accounting for the commons remains elusive and controversial. As the government is increasingly being challenged to consider future generations the question of private property rights is being questioned. As an illustration, much of the natural resources are held as private property, when the debate emerges as to the rights of future generations to those natural resources, the conflict of private ownership will require policy guidance.

The citizen aspect is emphasized in the stakeholder context where the professional is led through total stakeholder analysis as an essential ingredient in the EMS environmental performance process. "Sustainable development" broadens the traditional stockholder view where the organization as an exclusive economic institution is legally and ethically bound to earn the highest rate of return on investment. The stakeholder concept includes groups using their own criteria to determine how well the corporation is performing and judges management actions by their effects on the interests of all such stakeholder groups.

### **Western's Application of the Generalizations:**

These generalizations are reflected in the EMS Plan through the stakeholder assessment and Process Analysis model adopted by the team. The team, using the researcher

as a facilitator, developed a Process Analysis Model indicating: Process Name, Ownership, Identification (Internal elements and boundaries, Outputs and Stakeholders, Inputs and Suppliers), Analysis and Improvement Analysis. This activity provided an opportunity to better understand the systems concepts of EMS and to move the EMS awareness into the regional areas.

Rational ecology criteria are inherent in the process analysis through feedback and coordination assessed through an EIS like assessment of processes. Pollution prevention considerations help to define analysis impact criteria. Stakeholder involvement is incorporated. Evaluation is made through risk assessment. Since the process directs the analysis, a great deal of flexibility is allowed and encouraged. As the process becomes more ingrained in corporate activities, its resilience becomes more assured.

The morality was derived from guiding principles of government policy and professional associations. The GEMI principles originally brought to the attention of Western in 1992 but never adopted<sup>97</sup> were accepted by the team. The principles set forth the commitment to improving environmental performance by modifying practices where appropriate. The fact that the earlier 1992 introduction of these principles met with no interest or reflection on their application demonstrates the broadening environmental awareness developed by the team during the training. Both NEPA and Pollution Prevention are specifically mentioned in the team's vision statement.

As a Process of Improvement Principle, Western states:

To continue to improve corporate policies, programs and environmental performance, taking into account technical developments, scientific understanding, consumer needs, and community expectations, with legal regulations as a starting point; to move beyond to a commitment of

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<sup>97</sup> The principles were originally provided Western following a DoE Audit of the environmental practices at Western. As in the first case study reported herein, the principles alone without their integration into a broader paradigm for change had little chance of being adopted.



environmental stewardship throughout Western.

The process analysis reflects this principle with development activities continuing through November, 1996. The ongoing systems understanding is reflected in the refinement of the work product, which has focused on the engineering process at Western.<sup>98</sup>

The commitment statements made through the EMS are now reflected in the newest Strategic Plan released by Western in late 1996. This plan is a statement of the new organization policy of Western whereby its operations will be performed.

**10.3.4c Beliefs that:**

- **Values of an ecosystem are fundamentally based on rational ecology utility.**
- **The relationship of man to his environment, based on rational ecology utility, can be advanced by innovative and skillful use of NEPA/pollution prevention policies.**

**Training Theory and Procedures:**

The training focuses on NEPA and pollution prevention theory, methods and tools within the public policy and regulatory framework of the program. Careful attention is paid to NEPA concepts of the environment and the similarity to EMS/ISO approaches to environmental performance. The NEPA process for bringing information and methods into the process of public planning and decision making is used as an example of how environmental impacts and effects can be determined within current policy processes. The interrelatedness of the NEPA method and process can serve as a vehicle for EMS process design. The EIS arrangement of information taken in its entirety suggest its use as a formal

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<sup>98</sup> It can be said at this point that the EMS teams are not given any "time-off" from their day-to-day responsibilities to address the EMS development. Nor is any extra pay afforded the team members. Most work on the EMS is conducted after hours or in between assignments.

comprehensive socio-economic and environmental growth evaluation framework. The policy/standard have almost identical environmental consequences parameters which can be shown by comparing definitions:

**Environmental Consequences:** are relative to beneficial or adverse impacts, and change is relative to the degree (known and possible unknown risks) to which public health and safety is affected, unique characteristics of a geographic area are affected, precedence for future actions, individually significant and cumulative significant impacts...(NEPA).

**Environmental Impact:** any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products, or services (ISO).

One of the key considerations in applying this idea in the United States is to maintain the NEPA process independent of NEPA as a regulation. As a regulation, the burdensome implications of litigation and compulsory paperwork would hamper its adoption as a tool to assess company process impacts. Keeping this consideration in mind, the team wholeheartily endorsed the concept but considered that any linkage by name to NEPA was to be avoided.

The concepts of rational ecology were introduced in the training through the integration of the principles of environmental science as a forerunner to learning about specific environmental performance evaluation. In this area the principles of mass conservation, energy behavior, ecological concepts, appropriate technology and environmental economics were covered. The rationale for this is that many professionals, especially those not involved in ecology do not have a good understanding of these concepts. In order to deal with the responsibilities and interactive environmental problem-solving requirements, the basic of environmental sciences, technology and economics are required. Ecological concepts focused on the implications of waste recycling, dose-response relationships and the fate of toxic substances in the environment. With this background information, the professional's learning moves into environmental performance in the context

of administrative, management, and operational systems.

Understanding the organization training moves through total stakeholder analysis, life-cycle analysis, risk assessment, regulatory assessment, refining and clarification, and developing and providing cost estimates. This approach reinforces the importance of keeping in mind government, environment and citizen priorities in a consolidated and interlinked approach to the EMS.

### **Western's Application of Beliefs:**

A consolidated environmental impact assessment was integrated within each process analysis. The elements of the assessment and the evaluation of significance began with a process flow diagram. An evolution of this process evaluation procedure is currently being considered which covers the development of an original software program. Once developed the program would cover local environmental impacts, as well as regional and global environmental impacts. Significance impact ratings are assigned according to scales of severity, probability and duration. As a result of the researcher's training program, the concepts of rational ecology are currently being considered within the categories of potential, regulatory/legal implications of exposures, difficulties in changing impacts, costs of change, effects on other activities, concern of interested parties (stakeholders) and effects on public image.

Perhaps one of the most far reaching integrations of rational ecology actions involves the researcher's early discussions with Western's regional managers on the implications of using rational ecology criteria as a utility sector measure of environmental performance. If this concept is adopted the process evaluation criteria will be categorized according to criteria in which the utility of process characteristics (impact) is judged by degrees of feedback, coordination, or linkage to companion processes and systems, flexibility closely

associated with emergency response, and resilience linked to operating ranges of the utility attributes.

Aspects of rational ecology are inherent to the process analysis currently, but its complete integration is on hold pending additional discussions with Western's Regional Managers.

#### **10.4 WESTERN'S CONSENSUS ON EMS CEDM APPROACH**

Overall the researcher's EMS training concepts, and early EMS planning has met with approval from the original EMS Development Team, the environmental staff of the Western Regions, and upper management. Upper management has recommended the approach to other utilities in the regional areas. Feedback from the EMS team leader cites several characteristics which have triggered the acceptance and support for the EMS CEDM evolution process.

##### **10.4.1 Management/Environmental/Engineering Cooperation**

One of the earliest interdepartmental integrations into the EMS process analysis was engineering. Engineers, historically considered external to environmental interests, at Western have voiced support for the developing interface with environmental factors. Upper management has voiced support for the EMS process as advancing the overall vision of the company and adding to the morale of the environmental staff. This was associated with environmental professionals gaining a better understanding of power marketing which provides the short and long-term economic stability of Western.

Beyond Western the referral of the training and facilitation to other utilities by upper management indicates that the approach has the potential for duplication.

The understanding attributed to systems thinking and the reinforcing and balancing factors of the CEDM paradigm continually seek external verification, with every process

comprising Western's operations being evaluated.

#### **10.4.2 Scope**

The value orientation developed through the EMS process has been instrumental in a variety of applications. Beyond the direct EMS Planning elements, additional economic opportunities for expanding the environment as a value added aspect of power marketing (positioned as a non-profit center for Western) are being considered. This is a far cry from the earlier rigid compliance mind-set of environmental staff, an outlook shared by all of Western's operations. Value added ideas include environmental self-assessment support to suppliers and customers, assistance in energy conservation, and energy infrastructure design. Sharing a common belief, the team sees a greater efficiency in operations and senses a means to restore diversity to the environmental professional's role beyond compliance to regulations to that of an element of strategic management. They believe that the EMS will serve as an informing and empowering tool to facilitate participation in creating environmental stewardship and partnering opportunities.

Traditionally, environment at Western was never seen as a value added center. Enthusiasm from the team leader for the prospects of extending the scope of environment is evident.

A unique element of the Western case (relative to the historical context in which NEPA has been used by government agencies) is that the policy intent of NEPA ideas has been offered as the means whereby environmental integration is to be extended beyond the boundaries of EIS activities. The potential broadening of environmental impact concepts to overall operations as well as using the intent of policy to inspire value added activities indicates the new directions environmental staff are taking.

### **10.4.3 Process Analysis**

The process analysis method, under the direction of the researcher, has initiated the formation of new relationships linked to government, environment and citizens. The team has been able to conceptualize an early version of a NEPA oriented process beyond its use in preliminary project evaluations to applications in all process analyses.

Process analysis which at best only looked at regulatory compliance in the past is now looking at process impact within the parameters of NEPA elements and pollution prevention (Note: Because of the strong NEPA compliance history at the agency, elements of NEPA outside the regulatory parameters are not considered as "NEPA," but are called environmental assessment criteria.)

In its complete form the process analysis as a strategy and its associated development tools has the critical EMS CEDM attributes.

### **10.4.4 EMS Feedback**

The team leader has recently (March, 1997) contacted the research to note that the team had received 320 responses from the EMS questionnaire sent throughout Western. These responses not only indicate an awareness of the EMS process but an interest in its development. Comments have generally focused on process analysis.

## **10.5 EMS CEDM PARADIGM EVALUATION**

The EMS is developing both within the ISO framework and outside. The case study does not make the argument for ISO beyond its timely introduction to management as an innovative infrastructure that can be used to advance a CEDM directed EMS. Therefore the EMS not ISO is the central commitment focal point. It is the researcher's opinion that the CEDM paradigm enhances the possibilities of the EMS process and provides the guidance to move into the new era of commitment to the environment. The reasonableness of the new

management integration. CEDM is compatible with alternative terminology such as environmental stewardship, sustainable development or strategic environmental management. Whatever terms are used, the central factor is, "Was a comprehensive environmental decision made?" Are there integrative factors that follow the CEDM paradigm that can be identified?

In this instance looking for CEDM within the Western EMS framework, CEDM is identified through:

- Obligation of the environmental professional to move beyond compliance.
- Linkage of the defining issues of CEDM: government, environment, and citizens (customers) as priorities in decision making .
- Reinforcement and balancing factors of NEPA ideas and pollution prevention used.
- Systems integration— environment integrated into business functions.
- Rational ecology introduced through defining parameters of environmental stewardship.

This case study highlights the importance of maintaining the integrity of the paradigm, meaning that the attributes of government, environment, and citizens must be taken into account within an integrated framework. The previous case in Great Britain, illustrates an EMS approach that did not integrate citizen factors, the government interface was weak, leaving the environmental attribute to fend for itself. The environment alone was inadequate as a basis for changing mind sets and embracing the paradigm possibilities.

The importance of training followed by facilitation aided the implementation and application of the EMS as an infrastructure for CEDM. Training opens up opportunities and provides an introduction to a different way of thinking about professional responsibilities and the role of the professional in business and society. CEDM can be adopted through the EMS structure.

As a means of solving problems better, an EMS developed under the CEDM paradigm reforms and empowers its users to participate in creating accomplishments that can be considered the early models for realizing environmental stewardship and achieving sustainable development.

#### **10.5.1 Potential Impacts of Western's EMS CEDM Approach**

Beyond the direct impact of Western's activities identified within the case study, several associated impacts are noted which highlight possible future implications of actions.

Western, as a department of the DoE, has the potential to have a significant impact on the government's approach to, and interest in, EMS evolution in the United States. The Western team is taking on a new perspective and total approach to achieve an EMS. In branches of DoE outside Western, to the extent that EMS is being implemented at all, the approach adopted applies an ISO framework much like Western's earlier approach. As Western's Plan evolves, and DoE becomes more involved, Western's approach may move onto the agenda of the overall government agency.

DoE as the lead agency for the implementation of the United States Energy Policy, may then utilize elements of CEDM suited to the broader interests of the government.

As Western accelerates its stakeholder analysis, Federal, state, municipal, cooperative, and public utility customers in 15 states will be introduced to the government, citizen, environment issues addressed through Western's Plan. The broader implications of this are difficult to foresee.

Western's unique application of the environment as a value added center is a first of its kind within the DoE. While utilities have been involved in energy conservation initiatives for many years in the United States partnering with customers under this broader interpretation of environmental services is novel.



## **PART D**

### **SUMMARY AND CONCLUSIONS**

Problem-solving research deals with the real world, and uses various disciplines to bring together all the resources appropriate to reaching a solution. This thesis defines the problem in Part A and investigates problem solution avenues in Part B. Part C represents a testing-out of those problem solutions through case studies. The resulting conclusions in Part D are all aimed at advancing the environmental professional's field of learning, where, as they become more aware of CEDM attributes, greater problem solving capabilities will be achieved.

The ideas and arguments that CEDM paradigm building has generated relate to the core of the environmental professional's way of learning and thinking. Because, according to Senge (1990) learning "always involves new understandings and new behaviors, thinking, and doing" (p. 374), we can expect the debate to involve all aspects of the path taken toward a new way of professional practice and professional responsibility.

The research described herein comprises an investigation into the origins of the CEDM idea, uncovering the critical balancing and reinforcing interrelationships associated with the advancement of CEDM, and the linkage of a CEDM paradigm to the design and development of an innovative infrastructure within the business community. CEDM as a set of beliefs, generalizations, and values reorders priorities and sets the professional on a path of commitment. Commitment can be made to stewardship of the environment and/or sustainable development as well as to eco-efficiency, eco-economics, or the industrial ecology fields that nurture economic growth and environmental quality. The critical contribution of the CEDM paradigm is represented by the guiding ideas, theory and choice of tools and strategies supporting the path taken. All aspects of CEDM are aimed at

revitalizing the professional community through a commitment directed by a particular value orientation.

Ultimately the health of any new paradigm can be measured by the degree of commitment to that new world view. Vitality can be gauged by the degree of tolerance for opposing points of view. Finally the CEDM paradigm encourages debate, as it introduces professionals to a different way of thinking about the environment and their role as stewards.

## **Chapter 11: WHAT IS CEDM?**

### **11.1 A PATH TAKEN**

CEDM represents a paradigm for change. The paradigm is based on an obligation ethic with generalizations and beliefs contributing navigational aids for professional practices and responsibilities. A study of CEDM directs professionals to the earliest Caldwell requirement to "learn-up" to responsibilities through the learning disciplines. The underlying nature of CEDM includes collective learning in search of a holistic world view directed to economic growth and environmental quality.

As a contribution to the development of the discipline, CEDM's research involves the identification and refinement of a commitment strategy to economic growth and environmental quality that directs the professional to a new understanding and new behavior. CEDM through its evolution in practice can lead to the common good goals called for in sustainable development and environmental stewardship. Goals which the Sustainable Development: Final Report (1996) says will require a new way of thinking.

The CEDM path can lead to striking new advances in the professional's ability to manage the environment and contribute to organizational learning as the underlying

foundation supporting business viability and economic growth. Traditional management of the environment focuses on regulatory compliance. Insight into the future however, tells us to go beyond compliance to a commitment to the environment. Commitment in the environmental sense has been proposed through, for example, ideas of environmental stewardship and sustainable development goals directed to the common good. These goals will evolve through natural changes, but fundamental innovations can only take place when new learning expands the potential for individuals to see things differently.

The research reported herein departs significantly from the main line of decision making literature by following the three research objectives:

- Articulating the guiding ideas and priorities for environmental decision making that build on the original work of Lynton K. Caldwell.
- Exploring and articulating the key system dynamics which reinforce and seek to balance the CEDM guiding ideas.
- Demonstrating the health of a new paradigm through professional commitment and application in the workplace.

Through these objectives the strongest elements that can collectively be called a CEDM paradigm are described. The paradigm is regarded as a guide to seeing a larger world view and contributing to the role of environmental professionals as environmental stewards.

The environmental professional community requires a paradigm that can advance the practitioner's understanding of the integrative factors involved in CEDM. Definitions are not enough, tools without theory and guiding ideas leave the professional without a vision orientation, and goal-like pledges without a means of implementation provide the professional little operational guidance. The core of practice and professional responsibility must be a new way of understanding, of seeing and creating a vision, exploring opportunities,

and responding to pledges made on behalf of the common good. This core of practice must be supported by sound research whereby ideas can be clarified from their founding principles. Pioneering environmental management professionals with their minds on CEDM may look to the common good with a clearer insight into how to make it happen and with a confidence that CEDM has a substantial policy base and operational sense. As an emerging group, environmental professionals can learn to effectively and ultimately, through a collective effort, significantly influence decision making in the private sector.

Private sector decisions have been affecting the environment since the beginning of the industrial revolution. In the past twenty years, environmental management has undergone a complete transformation. As an integrative component of doing business, the environment is a major factor in the next stage of transformation.

The researcher approaches this next transformation era through Caldwell's "harmony with nature" ethics of the 1960s but from a different way of seeing. The study agenda moves CEDM away from abstract ideas and political scientist assumptions, toward a paradigm best suited for the 1990s, aimed at economic growth and environmental quality. This research builds from Caldwell's structure of government, citizens and the environment, but moves away from his current strategy to revitalize and reaffirm CEDM through a constitutional amendment. The researcher does not believe that the essence of CEDM can be constitutionally dictated by the federal government to agencies, industry and citizens that have been traditionally led by regulatory compliance and technology solutions, and burdened by a history of gridlock on environmental values. CEDM's future is instead reestablished through an alternative learning agenda. The conclusions from this research are driven not from a political scientist mind-set with a foundation resting on America's founding political ideal and theory, or "that which we intended to do," but from the mind-set of an

environmental professional building on the foundation of the learning organization for economic growth and environmental quality, or "that which we must do." The new era of change is having its paradigm formulated in the last part of this century, with its full application still on the horizon. Paradigm changes cause the professional to see their world differently. The cumulative outcome will not be a dramatic revolution, but a natural evolution reinforced through a belief that progress is being made in environmental quality and economic growth.

Case studies show avenues where rational ecology is a real world possibility and that innovative structures in business can be used to advance CEDM. CEDM can begin to be recognized by its practices and problem solving attributes.

Conclusions are risky but key reflections can now be made about CEDM.

## **11.2 CEDM: A WAY OF SEEING**

In Kuhn's thesis paradigm building is "embodied in a way of viewing physical situations rather than in rules or laws" (1970, pp. 190-191). The 'way' is structured through a process of learning. As the professional moves through the three stages of the learning disciplines in relation to new values and assumptions, new action rules, and new CEDM cognitive capabilities, each professional will seek to create new structures to deal with the complex situations and policy network revolving around economic growth and environmental quality.

To follow Kuhn in an illustration of this—he imagines two people standing at the same place and gazing in the same direction and each must address the same problem. Interpretation of the scene follows perception, and it is at this point where the learning disciplines can begin to fashion our response. For Kuhn, and for learning discipline experts, the perception and interpretation depend on each individual's nature and amount of prior

experience and training. For these two individuals to follow the same paradigm their perceptions must be characterized by some commonality or norm of guiding ideas and theory. This research proposes that a commonality and norm between professionals can be developed through the refinement and application of a CEDM paradigm.

Placing the paradigm first in the hands of environmental professionals within the business community strikes at a central influencing factor directing how the environment is integrated into strategic decision making in the workplace. Businesses relate to public policy through a common consideration; they are all compelled by social legitimacy. The organization, as part of the wider system, is guided in its ordering of actions by the expectations of society (Marcus, 1984 and Marcus *et al*, 1987) The government, recognizing this societal influence has through policy and regulatory manipulation in the 1990s begun a move towards a self-regulation concept unique to the United States, given its historical command-and-control and environmental conflict background. This, coupled with the government saying that the responsibility for the common good belongs to society as a whole, leaves a great deal of potential influence in the hands of various societal stakeholders who may determine the parameters of the common good. Thus, although environmental professionals are not the sole decision makers, their practices and principles have a deciding influence on the future direction of environmental quality and economic growth.

The case studies move CEDM through NEPA and PPA policy instruments with a rational ecology agenda. Showing that rational ecology can direct the future evolution of policy, professionals have the opportunity to manifest CEDM through many avenues. The case studies move CEDM into the workplace where both policy and strategic management can be integrated under an EMS to advance CEDM.

The United States is facing a choice in the 1990s, establishing the most cost-effective

conditions for increasing the viability and commitment to self-regulation, or expending more energy and resources developing the direct regulatory approach or what has become known as compliance through command and control. Policy has an evolutionary opportunity to move toward self-regulation and a commitment to the broader visionary expectations of the common good. Management also has an opportunity to make dramatic changes in the overall responsibility industry assumes to impact the common good.

The CEDM paradigm supports the overall direction of policy intent and management strategy by reinforcing the goals and requirements necessary for moving from grudging compliance, with seldom-realized benefits, to commitment to the moral intent of the law with a will to make it happen, creating whatever structures are necessary.

The CEDM paradigm carries with it decades of policy and process evolution and is a new way of thinking that can support the sustainable development philosophy of the 1990s and beyond.

### **11.2.1 Can CEDM Work?**

On the basis of the case studies reported, it is concluded that yes, it can work. Furthermore it can work best and be done by those having a motivation derived from self-interest in preserving the economic base of a qualified industrial growth. Work in the sense of what we are doing and what accomplishments are being sought, CEDM works when the paradigm surrounding the ideas, theories and methods directs professional judgements. Used by those advancing a legitimate economic growth and environmental quality guide for decision making, CEDM carries the prospect of reinforcement and further advancing the three developmental stages of the learning disciplines: new values and assumptions; new action rules; and new cognitive capabilities.

### **11.2.1a New Values and Assumptions**

Our way of seeing the world and our relationship to it is based on perceptions and assumptions of reality. Opening up an abstract idea through systems thinking restructures the political scientist vision of CEDM and reorders values around integrative decision making of a business-environment nature.

The relevance of CEDM is primarily illustrated through a rich sense of understanding and involvement in the systems disciplines. Rigid ethical prescriptions driving values are neither possible nor appropriate for understanding or operational strategy. Systems thinking has directed the researcher through aspects of learning that evolved from beginning efforts to simulation exercises and evaluation by testing. The case study at Western indicates a maturity of mind in a sweeping view of personal vision moving to shared vision and all the follow-on characteristics of progressive learning. The EMS process created through a CEDM paradigm represents a major break from the majority of environmental decision making to date.

What is appropriate at this level of learning is an ethical commitment that creates a sense of shared visionary leadership. As a "functional citizen," the environmental professional can make CEDM work. The case study in Britain clearly indicates professional training and a maturing of the concepts is required before much success can be achieved. Moving into practices at the early stages of paradigm development will involve the trials-and-errors of advancing knowledge. Through the professional's understanding, practices, principles, and essential qualities CEDM has acquired a value orientation and a capability to revisit old assumptions about the environment and the professional's obligation to informed reasoning that moves beyond compliance.

Such a CEDM paradigm must have some core theory that supports tools and



strategies, some ethic that can be embraced by the professional community to move a research agenda into the mainstream of the practicing professional. The fundamental values underlying NEPA are reformulated not as harmony with nature, but as an obligation not to do harm. This ethic has been offered as the thread that binds the ideas of government, citizens, and the environment through an innovative EMS structure situated within the business community.

When the Sustainable America: Final Report, (1996) calls for a new way of thinking and describes that thinking as a conviction to economic, environmental, and social equity, some value reorientation must follow. As industrial strategists and environmental initiatives continue to refer to ethics in their policy agendas, the term ethic must be translated into some basic understanding. The essence of the environmental professional "ethic," an obligation not to do harm, is established through the CEDM paradigm.

Ethics involves principles on which we rely, methods used, and implementation. In each case, the professional is guided in his/her obligation not to do harm through the generalizations and beliefs of CEDM. These generalizations and beliefs are most evident in the Western case study where EMS practices direct comprehensive environmental decision making through a business/environment management infrastructure.

The Western case shows why and what decisions would be reached should environmental professionals rely on this type of obligation-oriented decision making. Is Western, as a economic institution, better off? Is Western's environmental stewardship better qualified? Are environmental professionals at Western better able to deal with the ongoing decision making of their professional responsibilities? Is Western better able to support the sustainable development framework put forth in the United States?

In answering these questions, the contribution of CEDM is realized first because

these were the questions asked of the EMS team. Western's Administrator, J. M. Shafer (1995) says that by the end of 1998 Western will have completed a transformation process. Changing the organizational culture is considered a vital part of their reorganizing, restructuring, and reengineering. These questions direct Western to look at the ethical factors critical to making Western a new type of organization. These questions answered in the affirmative at the level of new environmental values and assumptions begin the change process.

The EMS team at Western chose a particular route to their EMS as their contribution to this change. Beginning with professional training, this basically represents a type of leadership committed to a new vision. The EMS CEDM vision began first to crystalize in the minds of the researcher and the EMS team leader. Clarity was enhanced as the whole of the EMS team began a learning process and plans were made to implement their particular vehicle of change, the EMS. The sense of responsibility throughout the environmental structure at Western varies from energetic and motivational (inspired) to lax. Centers of action are becoming clear. Directing CEDM to work through an EMS is answering the research question. The researcher believes that it has been done at the level of new values and assumptions, and that it will be further developed in operational activities.

#### **11.2.1b New Action Rules**

Changes are rarely propelled merely by knowledge, emotion, or even values; the exercise of power is most often required (Etzioni, 1988). Power is reflected in the position environmental professionals hold in the corporate structure and in the amount of leverage they can have on overall business strategy. Power in the past has been most often relegated to "keeping up with compliance" thereby reducing risk and liability. Breaking the bounds set by compliance, the professional now has the opportunity to move into the corporate structure

where, as the Western case study shows, that power can be expressed through, for example, the acceptance and application of an EMS. The degree of influence on the common good is potentially enhanced as the professional works through the total business structure and action centers are created to achieve some degree of CEDM.

The CEDM paradigm as part of the modern environmental professional's makeup affects the way people see their world and themselves, and the way they behave. For those having a motivation derived from self-interest in preserving the economic base of industrial growth, the paradigm provides a great deal of leverage to advance a legitimate guide for actions and decision making. For those professionals seeking to achieve a change in the status quo, the paradigm is a way of seeing and advancing the establishment of a sustainable development working framework for the United States.

This change in policy, beginning with NEPA and pollution prevention as a life-cycle policy strategy, provides for a "cautious bet-hedging approach to decision making in which allowances are made for ignorance and changing values" (Ponting, 1990, p. 3). As the United States moves from a rigid compliance orientation to "building a new framework for a new century" the prospect of using NEPA coupled with pollution prevention reflects the call for new, flexible, performance based decision making.

The researcher's testing-out of NEPA and pollution prevention using rational ecology policy qualities and values provides for tools, strategies, and particular policy networks relevant to government, industry, and all sectors of society. Historically these various stakeholders have not come together and communications have been inhibited by compartmentalized professional disciplines reinforced through bureaucracy. Linking NEPA and pollution prevention as a life-cycle policy strategy following rational ecology guidelines and criteria is possible at the level of the professional. Answering the requirement for

strengthening communities and allowing them to deal with issues of vision and setting goals, strategic planning under the NEPA process and applying rational ecological benchmarks, reinforces the changes required under sustainable development.

The rational ecology testing-out applied in this research does not provide the definitive checklist for rating and ranking, but the activity does provide insight into the relevance of rational ecology in policy to determine rational baselines and to measure quality of life goals. Dryzek (1987) suggests that there is no system of policy interrelationships that can provide for the overall utility value of a system based on its productive, protective and waste assimilation capacity. The testing out suggests there are some well applied strategies of NEPA building toward a symbiotic relationship. Linking the NEPA actions with longer-term pollution prevention strategies can legitimately steer CEDM through a rational ecology construct that could ultimately provide the quality of life baseline and benchmarks called for in the sustainable framework. (Because the sustainable framework suggests that communities identify key issues, create a vision for the future, set goals and identify measurable benchmarks, it is paramount that industry, in line with community/stakeholder structures, develop the means to achieve the sustainable new way of thinking.)

This research shows that the EMS can provide a viable training framework and business structure to operationalize the CEDM attributes. These attributes support the call for both individuals and institutions to take on greater responsibility, and embrace an ethic of environmental stewardship. The government's desire for smaller government in line with sustainable development goals must be met with a participative and responsible business community.

The environmental professional must be able to interface with the key sustainable development policy directions which emphasize flexibility and performance based systems,

adoption of a voluntary system for product responsibility, cost-benefit of achieving environmental goals, strengthening communities, natural resource stewardship, and development of a baseline for quality of life indicators. To interface with this type of change (described as a "new regulatory system" in the Sustainable Development: Final Report) the professional, including government, industry, and community alike, must have a reference base of guiding ideas and theory reflecting these types of directions.

Such an undertaking requires massive restructuring at all levels of the policy network. Where inherent gridlock does not describe the historical background, explicit rules may be suitable, but where the environment still suffers from even a clear definition and value orientation, the only appropriate path is through a path of evolutionary learning toward a CEDM consensus.

As Western takes on its restructuring, centers of action revolving around the EMS will eventually be formed relating to all the processes making up the organizational structure. In the early stages the EMS process analysis phase is developing environmental assessment criteria that look for NEPA type aspects along with the usual regulatory compliance requirements. Stakeholder involvement is developing within and outside Western.

The systems approach is reflected in environmental issues having a high profile role, which has not been the historical case at Western. Taking a vision and sharing it throughout first a team and onto all environmental professionals and top management at Western is another example of new leadership. Understanding and analyzing the process systems is a far cry from the end-of-the-pipe compliance mind-set of earlier Western actions. Furthermore, the combination of EMS efforts cover all Western Regions. Also, the commitment to the EMS provides a commonality of purpose among the environmental professionals within Western.

More generally, Western's approach appears to be worthy of duplication in the eyes of Western's top management, as the group's actions to date are a point of referral to other utilities.

As a point of speculation the question can be asked: Can the utility sector critically impact the sustainable framework in the United States. The answer must be yes. There is little question that the energy resources of a country provide the baseline system upon which all activities are based. A CEDM directed EMS evolving within the DoE and its customers would in its evolutionary form cover the majority of United States economic interests.

To illustrate, Western is responsible for the energy movement created from the hydroelectric plants operating in the United States. Energy sales cover 15 states with transmission circuit lines covering 16,760 miles. Western manages power sales and is responsible for operations and engineering planning and construction for the totality of its system. New action rules which could develop around rational ecology criteria utilizing NEPA ideas and pollution prevention as a policy instruments could potentially impact the energy sector restructuring as a whole. Restructuring is characterized by privatization, new utility permitting, and future developments in energy conservation. CEDM has the potential to discourage environmentally damaging production and consumption decisions, refocus tax reform and direct subsidy policy in particular areas. Waste assimilation, production and protection aspects of impact assessment will ultimately impact many of the restructuring directions. Rational ecology criteria and sound EMS at the corporate level allow for a refocusing of actions and rules directed toward CEDM.

Restructuring energy development and transmission reflects the 'down-line' development of industry and community growth. The paradigm under-which future actions are made should have a dramatic impact on the sustainable development framework for the

United States.

### **11.2.1c New Cognitive Capabilities**

As this research and case studies indicate, professionals will evolve and continue on with the CEDM paradigm in any number of directions. Moving through the early stages of values and assumptions, and early action rules they will see more clearly their own assumptions, actions, and consequences of both. Illustrated by systems thinking which leads to experiencing more and more of the linkages between the balancing and reinforcing elements, CEDM opportunities are just beginning their development in the workplace. The evolution of these linkages will continually refine the CEDM paradigm as it is argued out by the professional community.

This allowance for reflective change and advancement of this emerging CEDM paradigm provides for unprecedented changes in the practices, principles and qualities of business and the individual. But what does not change are the CEDM guiding ideas, assumptions, and values under which we operate.

The United States wants to achieve some degree of progress toward sustainable development, therefore change through a 'new way of thinking' finds itself at the top of the government's agenda. From the economists, change through understanding how a business works is at the top of the management strategist agenda. From the environmental community, change through a commitment to the environment is called for. CEDM integrates and offers the environmental professional the potential to become an active, functional citizen instrumental in enabling the changes called for in the future.

### **11.2.2 CEDM: Limitations**

To establish this CEDM way of seeing, a new paradigm was developed which provides for generalizations, beliefs and values. Generalizations are those expressions that

are deployed without question or dissent. CEDM generalizations provide the formal orientation of CEDM and those elements that, when set to text or when set in operation, the stakeholder knows to be an expression of CEDM.

A paradigm is also made up of beliefs, which are most commonly associated with guidance models. The CEDM model tells the professional what to account for and what should be looked to for stability, or basically what makes everything work. Lastly, a new CEDM paradigm provides a value orientation for the environmental professional.

The paradigm developed through this research suggests the path taken to environmental problem-solving would lead through:

Generalizations emphasizing that:

- Rational ethics and systems thinking can provide guidelines for human conduct.
- Government policy, based on sound science, can impact morality.
- Citizens have a key role in decision making.

Beliefs that:

- Values of an ecosystem are fundamentally based on rational ecology utility.
- The relationship of man to his environment, based on rational ecology utility, can be advanced by innovative and skillful use of NEPA/pollution prevention policies.

Values such as that:

- The environmental professional has an obligation not to do harm.

#### **11.2.2a Generalizations**

The paradigm generalizations are characteristic of CEDM. Different communities of professionals may differ in their interpretation of these generalizations in specific concepts and it is only through examples that the empirical concepts can be clarified.

Therefore clarity is achieved only through application. This is consistent with the



general situation in ethics and systems thinking which require principles, methods and judgements to clarify meaning. The inclusion of ethics and systems thinking in the paradigm is due to the researcher's acceptance of professionals being capable of making sound decisions and that they should be allowed the flexibility to do so.

Government dictating environmental compliance has not afforded the professional the opportunity to apply flexibility and innovation to environmental problem solving. The call for change however, requires that the professional first learn how to make decisions, i.e. through the use of ethics and systems thinking. This element of the paradigm does not impose prescriptive limits on action, rather ethical norms encourage openness within an overall orientation and commitment not to do harm.

Professionals understanding that government policy has not always had the best interests of the public in mind, should use learning to assess the scientific context in which policy is enacted. If policy applies sound science, the professional can utilize policy to the benefit of the common good, if policy is not supported by sound science, the professional has the flexibility to change, modify, and set in motion innovative instruments that have the potential to change policy. The professional is stretched to recognize and actively impact policy and move from being a passive instrument of compliance to being an active participant through informed commitment.

Citizens have historically been a 'wildcard' in decision-making, more associated with gridlock than with informed consent. The specific community of citizens considered herein are people in industry, and those stakeholders involved in industry administrative, managerial and operational aspects. The research suggests that the environmental professional is well placed to be the distinguishing 'citizen' that can identify baselines and rational operating parameters and help to set goals to maintain them with an eye on industrial innovation.

However, it is recognized that any number of professional groups could be distinguished as agents of change. Just as CEDM originally has specific characteristics that originated because it was developed by a political scientist, CEDM defined through an environmental professional carries other particular characteristics.

Overall the generalizations carry a distinctiveness that some would consider a weakness and others a strength. This is to be expected in the early paradigm stages where consensus has not been achieved.

### **11.2.2b Beliefs**

A central factor in this type of model approach is its very basic nature. Some scholars may consider that environmental models have surpassed the simplicity exhibited in the paradigm. Examples include, multidimensional or multiattribute utility analysis and modeling, risk factoring, economic concepts of efficiency. While this is true, the paradigm is not directed to this level of model and is only seeking to attract the broad consensus of professionals to the accountable elements of CEDM.

Here it is argued that it is this basic lack of general consensus on and understanding of CEDM beliefs that prevents the developed models from being effective in exhibiting data that hold meaning for most professionals and citizens alike. The utility criterion remains undefined though aspects relating to productivity, waste assimilative and protective aspects are recognized. The research suggests that these issues can be addressed along the lines of previous research by Dryzek.

How useful the establishment of baseline value orientations for the environment are is dependent of the conceptual framework of the professional community and society generally. In a perfectly functioning market, eventually the economic paradigm value attribute should determine the deciding beliefs. Until that time, professionals are operating around

economic assumptions of consumers, producers, and market structures; ecological assumptions of systems interrelationships; and policy assumptions that have as much to do with perceptions of reality as scientific reality. The CEDM paradigm takes into consideration the functioning market and the professional community today and provides a baseline paradigm of beliefs that allows coherent policy and management initiatives to emerge against a background of a consensus on generalizations and beliefs.

It may be argued that the paradigm has no model application and that it is inappropriate where advanced highly structured models are performing practical problem solving. However, the following conclusion summary from The Economic Model contribution to the Tufts University Center for the Study of Decision Making (1991) highlights the current state of the discipline (environmental economic modeling).

This chapter should read as an assertion of the futility of attempting economic analysis on a subject as complicated as environmental policy. We have great difficulty in measuring the benefits and disbenefits...In sum these problems appear to make economic approaches to water policy totally irrelevant. Why then has there been so much attention...The answer is simply that economic thinking and conceptualization appear to be the only alternative to a chaotic political battle with no concepts of the public good, but only "log rolling" and "pork barreling" (Rogers, 1991, p. 153).

A paradigm that can build consensus at the basic levels suggested would help to advance the current modeling field by first establishing the common (public) good.

### **11.2.2c Shared Values**

Some may argue that the value orientation is, like the beliefs, too simplistic, and that the field has advanced beyond such a statement. But the values, directing the ethics of a professional are far from established. There are no socially binding values that can be associated with the environmental professional. Even the compliance orientation of professionals is not universal. Compared with, for example, medical doctors for whom ethics

is well defined: "Thou shalt not kill, nor shall you strive officiously to keep alive," the environment holds no such ethic.

The theory of bearing an obligation not to do harm carries a simplicity that has its origins in law, policy and social structures. When asking professionals what could be a central driver for their actions, regulatory enforcement continues to be the number one answer. Starting from this as what a professional accepts now, the research looks to a redefinition that can move the professional to commitment to self-regulation and a sustainable basis for environmental policy. Building from the avoidance of harm principle, compliance and enforcement are, of course, intrinsic to application of theory, but the key is that avoidance of harm also offers a broader viewpoint of professional practice and responsibilities. It is this broader value orientation that the paradigm generalizations and beliefs hope to capture in scope and fruitfulness.

Reflection on the values of a professional discipline suggest a formulation of absolutes at a level of generality that allows a consensus among practitioners. Consensus at the level of such a varied disciplined group can not be taken too far in the direction of actions. But guiding ideas would certainly provide coherence to an otherwise non-conforming group. Subsequently, CEDM in its evolving form may become more closely specified through research into both the qualitative and quantitative interpretation of the paradigm.

### **11.3 DEBATE ON CEDM DEVELOPMENT AND PLANNING FOR THE FUTURE**

Looking backward to the development of the research agenda, Bartlett (1990) concluded in his earlier research on CEDM that there are many avenues worth pursuing and all are understudied. Talking with Bartlett in the early stages of the research reinforced the

importance of the research agenda.

To answer Bartlett's concluding question: "Can it work?" and the underlying question "What is CEDM?" asked in this study, attention was concentrated on the environmental professional, whose position provides them the best opportunity, given the resources, for making CEDM happen. The working professional is characterized, and the research is restricted to professional activities within an industrial/business complex, in a developed country, operating with particular public policy opportunities and constraints. The professional outside the particulars of the United States policy network can, however, find insight from the research through its use of systems thinking, and the learning individual and organization principles which apply worldwide.

In selecting this avenue for making CEDM happen, ethics provided the central research theme. Application within the industrial complex, tailored the research to a type of business ethics which impacts the entire behavior of a business. Interacting at the level of the business structure, the professional's position was seen as a vehicle to impact economic growth and environmental quality through an ethical, obligation-oriented stance that pushes CEDM requirements through the policy network. Concentrating on the professional-business interaction inherently limited the study to CEDM within well-established economically driven and profit-oriented operations.

Within this arena of the environmental professional and industry, the study concentrated on the understanding and operations of CEDM by developing a path of study focused on answering the question CEDM: Can it work? in the affirmative. Seeing CEDM as the foundation for America's National Policy For The Environment, the intent and means to realize this national objective became paramount. CEDM was viewed as an opportunity to bring about the environmental quality and economic growth performance of the 1990s and

beyond. The path afforded an underlying set of principles and way of thinking that supports both the professional as an individual and the professional within business where economic performance is paramount.

To complement this underlying set of principles, the intent and means to operationalize a CEDM policy was provided through the dynamics of NEPA and pollution prevention strategies and operational tools. These two policies and their operational networks and stakeholders were seen as providing critical CEDM pathways for United States professionals. Operational tools identified through the EMS appear to be closely related to the paradigm elements.

Other policies and regulations certainly impact the study arena, but none of these had the well established government and public support of NEPA, and none of them provided the ecosystem concepts, self-regulatory directions, and sound science, risk oriented strategies of pollution prevention. On the other hand, other management initiatives could have been studied as structures supporting the paradigm in the workplace.

In the future, CEDM can be called upon to organize the new way of thinking called for in the United States approach to sustainable development. As the underpinning for NEPA, CEDM provides an appropriate paradigm for the key recommendations on policy changes needed to achieve sustainable development:

- Building a new framework for a new century
- Information and education
- Strengthening communities
- Natural resource stewardship
- Population and sustainability
- Demonstrating international leadership

The President's Council closed its conceptual and philosophical sustainable development debate in March 1996. The council closed, however, without establishing how the "new way of seeing" required to implement the philosophy could be developed. If we look to the NEPA philosophical closure with the some insight, we can expect vague and obscure understanding of the underlying concepts. CEDM clarity, at least to some degree, is critical to the realization of sustainable development.

The Council is now moving into and supporting the implementation of sustainable development through private sector initiatives. This research hopes to see CEDM as a positive contribution to the private sector whereby the policy changes needed can be achieved.

The way of seeing CEDM adopted in this research inherently imposed limitations on the overall research agenda. Such limitations reflect the researcher's background, research setting, research resources, and route taken to develop the abstract idea of CEDM. Nevertheless, the approach developed here and its lessons learnt open the door to future studies and investigations into any number of areas.

#### **11.4 APPROPRIATE NEW RESEARCH**

Looking forward, CEDM opens up avenues in all the disciplines, each of which would be unique in its expression of the evolving paradigm. The fact that no one interviewed for this research expressed a "way of seeing" CEDM suggests that environmental decision making attributes needs strengthening.

Using the CEDM paradigm from this research, education could be extended into public and private initiatives. Institutional cooperation would be solicited and appropriate evaluation parameters determined according to development in the areas of, for example, systems thinking, policy and rational ecology.

A timely companion to this research would be studies associated with the evolution of EMS and the two general approaches by which the concept is being understood, designed and implemented. From the United States perspective, moving from a rigid compliance orientation to a prospect of environmental performance acting as the primary focus suggests that all aspects of the organizational structure would be affected. Therefore an EMS from the perspective of its administrative, managerial and operational aspects can provide fruitful insight into systems understanding. Also the ISO series of environmental standards can provide complementary insights.

Advancing the applications and refining rational ecology could prove useful to process analysis professionals. This particular aspect of the EMS is proving itself both difficult to understand and implement under current professional understanding. Professionals need greater knowledge of systems dynamics, the social sciences, and economics to effectively critique a process and determine through its linkages the environmental aspects of actions.

Broad directions for future research can be found at each stage of the research agenda, from selection of the researcher to final conclusions. CEDM is now at the stage of open debate through which the hopes for innovations and continued improvements in environmental decision making are formulated by the research and professional communities.



## Chapter 12: CAN CEDM BECOME THE DOMINANT PARADIGM?

The research has moved comprehensive environmental decision making (CEDM) from an abstract idea to an ideological outlook on the relationship between government, environment and environmental professionals. A credible structure for a professional's application of "sustainability" ideas is presented, but to be a more rigorous paradigm it means mastering its theories and methods as a means not an end.

What industry actually does in its day-to-day decision making and how they communicate what they do is difficult at best. CEDM represents a guided body of thought and actions on how the professional responsible for environmental affairs can influence industry and its contribution to sustainability. Shedding light on how the environmental professional can direct decision-making in the environmental sense – CEDM - requires first a perspective on the topics presented in this research.<sup>99</sup> To move an idea from the fringes of academia into real-world applications CEDM employs among other things a sense of professional ethics discussed in Chapter 5 and the use of government policy and regulatory instruments which are detailed in Chapter 6. The attributes of the man and environment relationship suggested in Chapter 7 for CEDM is based on the concept of a minimum utility of an ecosystem which is accounted for through an ecological and policy perspective patterned after the work of Dryzek's Rational Ecology. This concluding chapter represents avenues of continuing improvements in the areas where CEDM is most vulnerable.

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<sup>99</sup> Chapter 1, Sections 1.3.1 through 1.3.5 presents the background on the environment and politics, economy, society, Utilitarianism philosophy and professionals in the United States. CEDM learning is "fundamental in ensuring that utilities are determined rationally, even if the basis of their assignment can still be debated."

CEDM can be challenged on many fronts. One challenge is its ability to deal with the ongoing entwined problems of sustainability and ecological economics.

## **12.1 SUSTAINABILITY THEORIES AND THE DEBATE ON MAN AND THE ENVIRONMENT**

The World Commission on Environment and Development (WCED) put forth the most widely used definition of sustainable development 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (1987). Sustainability is driven by the question, what are we trying to sustain? The key characteristic of sustainability was developed in 1946 by Hicks when the definition of capital was defined as "the maximum amount that can be consumed without eventual impoverishment." Capital is the stock of productive wealth. Capital is man-made, human or social, or natural. The main operational principle is to keep capital intact. How and in what context it remains 'intact' and generates the flow of services in a system refines further the quality and quantity of wealth. Agreement on sustainability begins to break down after this. There are many concepts of sustainable development (SD) (often incompatible with each other) which are suggested and debated in the literature. What this suggests is that the debate has exposed a range of approaches which differ because they are linked to alternative environmental ideologies.

Ultimately these ideologies can be ecocentric in nature and are represented by the extreme deep ecologists and they can come close to rejecting even a 'modified' idea of development based on the sustainable use of nature's assets. A minimalist development strategy is the morally acceptable ideology. From the opposite technocentric perspective, others argue that the concept of sustainability contributes little new to conventional economic theory and policy. Given this ideology, the

maintenance of a sustainable economic growth strategy over the long run merely depends on the adequacy of investment expenditure. Investment in natural capital is not irrelevant but it is not of overriding importance either. A key assumption of this position is that there is and will continue to be a very high degree of substitutability between all forms of capital.

Ultimately these perspectives give rise to three broad, but not necessarily discrete, approaches to sustainability. Economists relate sustainability to the preservation of the productive capital stock. Physical scientists relate sustainability to the resilience or integrity of biological and physical systems. A third view relates sustainability to a concern about the adaptability and preservation of diverse social and cultural systems.

Two positions on sustainability have ultimately evolved from these perspectives and approaches - weak sustainability and strong sustainability. In both cases the focus is on capital stocks – their quality and quantity. Capital trade-off situations and maintaining optimal stocks are always relevant, as are the relationships between society, development and the environment.

### **12.1.1 Weak sustainability (WS)**

Under this interpretation of SD, it is necessary to single out the environment (natural capital) for special treatment. What is required for SD is the transfer of an aggregate capital stock no less than the one that exists now (this is the weak sustainability constant capital rule). This is a central tenet of the neoclassical perspective where nature is just a sector of the economy for which other capital can substitute. We can pass on less natural environment as long as we offset this loss by increasing the stock of for example, roads and machinery, or other man-made (physical) capital.

Alternatively, we can have fewer roads and factories so long as we compensate by having more wetlands or mixed woodlands or more education. WS is based on a very strong assumption, perfect substitution between the different forms of capital and WS is achieved so long as the investment is more than the combined depreciation of natural capital and man-made capital.

WS allows for forms of capital to decrease temporarily so long as they return to their initial levels.

The 'genuine savings rule' developed by Hamilton, 1994 reflects the WS economy.

If  $S > 0$ , then the economy is weakly sustainable. This is equivalent to: If  $I > R + P$ , given:

$S = \text{savings} = I - r - p$ , where  $I = \text{investment in man-made capital}$ ,  $r = \text{resource depletion}$ ,  $p = \text{total cost of pollution}$ .

### 12.1.2 Strong sustainability (SS)

Under this interpretation of SD, perfect substitution between different forms of capital is not a valid assumption to make. Some elements of the natural capital stock cannot be substituted for (except in a very limited basis) by man-made capital. Some of the functions and services of ecosystems are essential to human survival; they are life support services and cannot be replaced. Other ecological assets are at least essential to human well being, if not exactly essential for human survival for example landscape, space, and relative peace and quiet. These assets are natural capital and since they are not easily substitutable, if at all, the SS rule requires that we protect them.

$SS = K_n(t+1) \geq K_n(t)$ .  $K_n$  reflects natural capital, and nature as an input to production can not be managed according to its marginal product. The issue of irreversibility is critical to maintaining life support capital.

## **12.2 SUSTAINABILITY CHARACTERIZED BY CEDM**

Capturing the professional decision making process adequately to ensure CEDM is reflected is not a precise checklist exercise. There are however areas of compatibility between CEDM and sustainability which can be identified.

### **12.2.1 CEDM Compatibility with Sustainability**

CEDM does not fit neatly under weak vs strong sustainability interpretation, beyond an academic exercise the WS/SS boundaries are not rigid and perspectives overlap as do the theoretical perspectives of economics and ecology and their characterization of sustainable development presented by van der Bergh in 1996. Generally CEDM applies the Equilibrium-Neoclassical theory as a framework for decision-making, Ecological-Evolutionary, Evolutionary-Technological and Physico-Economic theory reflect the parameters for capital, environmental directions and interactions.

The weak and strong debate appears to focus on natural and man-made capital; the human capital element of the equation is often dismissed. CEDM uses Sociobiological theory to add a broader dimension to sustainability. It is here where human skills and knowledge as well as the ecosystem must come to grips with real-world conditions surrounding all forms of capital.

The CEDM paradigm requires human or citizen perception and interpretation of their environment as integral to any equation. This is important because weak and strong theoretical discussions of sustainability must eventually give way to the overarching operation of sustainability. Human capital directed by CEDM has an assessment method

that is driven by innovation and learning by doing.<sup>100</sup> Generally there are increasing returns, albeit not constant, to scale as the learning parameters increase. Analytical assessment can also be applied to the human capital insofar as continuous improvement affects labor inputs and technology advances. This is not to say that human capital replaces natural capital, what CEDM does say is that human capital reflects understanding and therefore the substitution argument between WS and SS is enhanced by human capital development.

Considering the anthropocentric materialism that is driving capitalism in the United States, the CEDM paradigm is seen as the most likely prospect for integrating sustainable concepts into environmental quality and economic growth decision making. CEDM seeks to characterize the thinking which must go into an industrial enterprise (industrial economy) as a subsystem of an ecosystem. In this system 80% of the nation's population passes through at some point in time, policy mechanisms are implemented, matter and energy is drawn from the environment, transformed and waste is created. CEDM characterizes what should be preserved and the conditions by which policy mechanisms must be operationalized to preserve an ecosystem's attributes.<sup>101</sup>

CEDM is driven by beliefs, generalizations and values which make the professional aware of the threat of irreversibility and the precautionary approach. Where to draw the line of interchange between capital is not perfect but the policy tools used by CEDM, specifically impact assessment and pollution prevention inherently drive CEDM toward maintaining the utility of productive, protective and waste assimilative capital

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<sup>100</sup> Different versions of Old Growth Theory play a prominent role in this research area. Robert Solow's essays on Growth Theory given at Stanford provides a critical review and update on various theories, most notably the work of Kenneth Arrow.

<sup>101</sup> CEDM is directed by Caldwell's perception, information and operational attributes on the environment See Chapter 6 and Chapter 10 for additional reference information.

stocks. CEDM is driven by maintaining the utility chosen through the incorporation of policy and/or management practices which provides for negative feedbacks, coordination, robustness or flexibility and resilience.

CEDM means holding the inputs and outputs of an economy at sustainable levels and respecting the source and sink functions of the environment. It means holding on to sustainable levels of capital which supports economic stability since the economy is dependent on the environment for nearly all phases of the economic process.<sup>102</sup>

CEDM works within the imperfections of societal values and the evolving demand curves and monetary values attributed to environmental capital and accepts that intergenerational equity and intragenerational equity concerns should be met before any society can attain the goal of sustainability. Social and economic development must be undertaken in such a way as to maximize economic growth while minimizing the effects of economic activity (on production, protection sources and waste assimilation sinks) whenever the costs are born by future generations. When currently vital activities impose costs on the future (i.e. mining of non-renewable minerals) compensation must be paid (i.e. performance or assurance bonds yielding financial aid, or new technologies allowing resource switching say from fossil fuel to solar power, etc.)

CEDM must maintain an economic stability and therefore it reflects on the history of economic development hampered by inequity or loss of capital. Examples include the irreversibility or cost prohibitive 'irreversibility' of groundwater contamination, raw material scarcity, quality of life factors prohibiting employment of

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<sup>102</sup> Sustainability within the United States is envisioned as a sustainable United States economy and is distinguished by six characteristics: a sense of responsibility shared throughout society for eco-efficiency; continued economic growth; sustainable resource utilization; protection of environmental quality; flexible and cost-effective government regulatory policy; and increased social well-being (President's Council on Sustainable Development).

quality workers, and areas currently being recognized, i.e. over-forestry, over-fishing, over-grazing, depleting aquifers, etc.

### **12.2.2 CEDM Policy Instruments**

CEDM is driven by economic based choices and policy directions and herein lies the pivotal interrelationship of CEDM to economics. To progressively move CEDM toward a stronger sustainability a number of rules (which fall some way short of a blueprint) for the sustainable utilization of the natural capital stock can be outlined (roughly ordered to fit the weak sustainability to strong sustainability progression):

- Better natural resource and environmental accounts which provide information on the interaction between the economy and the environment. In this respect all kinds of capital would be accounted for. (See Section 12.3 for case study summary.)
- Market and intervention failures related to resource pricing and property rights should be corrected.
- Maintenance of the regenerative capacity of renewable natural capital - i.e. use/harvesting rates should not exceed regeneration rates and avoidance of excessive pollution which could threaten waste assimilation capacities and life support systems.
- Technological changes should be steered via an indicative planning system such that, switches from non-renewable to renewable resources are fostered; and
- Renewable natural resources should can be exploited, but at a rate equal to the creation of substitutes (including recycling).
- The overall scale of economic activity must be limited so that it remains within the carrying capacity of the remaining natural capital. Given the uncertainties



present, a precautionary approach should be adopted with a built-in safety margin.

Alongside progressive economic indications of sustainability and policy adoption, monitoring, management controls and enforcement are issues that will never go away in the United States. To ignore them is to ignore the safeguards that provide protection itself. For the future, the promise of incentives must be realistic and the baseline cost for conservation must be established.<sup>103</sup> Alongside pollution prevention and environmental impact assessment policy and regulatory instruments there are new policy directions and initiatives in the United States that support sustainability and capital benchmarking.<sup>104</sup> It should become apparent to professionals that these policy vehicles promote CEDM:

- Performance based policy (and market) instruments that establish integrated accounting and tracking of ecosystem utilities. Comparative benchmarking can be done within each category when performance indicators have been assigned. System self-reliance can be measured as indicators are monitored. Examples include: Tracking pollutants to their many sources and then finding ways to combat them is a major undertaking for industry alone. The cross-media approach adopted by regulatory agencies fosters and eventually improves the

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<sup>103</sup> If the market on its own fails to identify and value natural resources or capital, policy steps in using an array of trade-offs which ultimately define ecosystem health and quality of life. Information gained from economic analysis, (EAs), regulatory impact analyses (RIAs) is used to justify regulatory requirements and policy market-based innovative approaches associated with air emission, ground and surface water pollution, solid and hazardous waste chemicals and pesticides.

<sup>104</sup> Policy instruments and the economics of cost-benefit derived from National Environmental Policy Act (NEPA) and pollution prevention are well suited to, for example, a materials balance, input-output, life-cycle analysis and precautionary approaches associated with the economics of operational sustainability. Pollution prevention provides for a more sustainable management system, as do the precautionary approaches, which are recognized and implemented through policy constructs such as NEPA or state environmental protection acts.

environmental outcome. Evidence of this can be found in the integrated approach the EPA has taken in the Chesapeake Bay area of the United States. Tradable permits systems that are specific to industry sectors, such as those developed generally for emissions for gases, are being considered. These would be useful to align industry sector conservation efforts. Alternative habitat conservation policies, such as conservation easements contracts, are being considered. Forward looking policies are unlocking the commodity value of heretofore intangible ecological resources, for example a "currency" for species and habitats is being developed.

- Policy which uses the precautionary principle which asserts that action(s) should be taken in advance of scientific proof and that there should be a respect for the margins of tolerance in ecological systems. This will affect the traditional cost-benefit policy analysis. Trade-off(s) analysis and Community Economic Analysis will reflect the ecological conditions for sustainability. Examples of these include industry approved operating permits which consider the total picture of a community environment, quality of life and the whole gamut of social and cultural phenomena.
- New performance based Environmental Management Systems are being discussed and have been formally presented as a new approach for policy. Systems would reflect participatory decision making while promoting performance goals which reinforce regulatory flexibility. Systems must integrate human, natural and man-made capital. Examples include: extended product responsibility that would be shared among designers, suppliers, manufacturers, distributors and disposers of products; and manufacturing based "balancing score cards." As illustrated in Section 12.3 CEDM would provide the framework and

operational guidelines toward a specific operational definition of sustainability that managers could propose for a firm or economic sector, and like in a "balanced score card" would provide information to top management to determine the results obtained from their decisions. Professionals and top management alike can determine the strategies and actions that will improve the environmental performance of their firms in the long terms to achieve the defined sustainability.

- Promoting and accepting that policy can reinforce the notion of weak sustainability or strong sustainability. The development rules of sustainability management would follow output and input rules, or waste outputs are within the natural absorptive capabilities of the environment and for renewable inputs use rates should not exceed regeneration rates and for non-renewable inputs the rate of depletion should equal the rate at which renewable substitutes can be developed (Daly, 1999). Rules would require the human capital be developed through the physical environment of the workplace.

These CEDM approaches can be characterized in most industrial settings. Problems will arise and there are no precise predictions. Most professionals will be considered pathfinders and mistakes will be made and different routes of correction will be tried. No one will be starting from a blank slate and all actions must consider current conditions. Some actions will go smoothly, some will generate surprises, and some will fail. The point is that the CEDM professional is portraying the how-to of many routes to sustainability and this takes the professional community, industrial setting and citizens closer to a general consensus, common goals and cooperative sustainable development actions.

### 12.3

### CASE STUDY SUMMARY

One example of CEDM that the researcher is currently refining is a project whose purpose is to develop an Environmental Management System in association with environmental performance indicators which reflect a company's sustainability mission and in turn identify sustainability performance associated with an industry sector. The project is a process but some early ideas on CEDM sustainable economics can be observed.

The Chairman and Chief Executive of ITT Industries has said, "At ITT Industries, we have come to the conclusion that the best way to allow our company to achieve the balance of sustainability is to embrace environmentally responsible, even environmentally aggressive, business practices" (ITT Industries Common Ground, 1999). The "sustainable system" for this project is arbitrarily drawn around the operations of ITT Fluid Handling Systems as a supplier to automakers in the United States. The management system will enlist any number of social choice mechanisms to minimize negative impacts of human intervention on the biological system(s) that support the industry sector.

The management system design must address the means for coping with ecological and human issues and how the ecosystem and policy system may be affected by human-induced problems. It must be orderly and self-regulation must be integral to the system's ability to support ITT Industries as a priority. EMS assessment and performance must reflect the set of social choice factors.

To accomplish the above, the EMS design for the company has integrated Environmental Management Accounts™ (EMA Accounts) as performance or sustainable indices. The accounts are being applied to the automotive manufacturing industry through the refinement of environmental performance indicators linked to the

requirement for all suppliers to have an ISO 14001 certified system.<sup>105</sup> The EMA Accounts reflect: raw materials use per unit of product, waste produced per unit of product and research directed to sustainability (for example, raw materials substitutes of a less toxic and/or recyclable nature) of sector along with the more traditional environmental accounts associated with regulatory compliance, injuries, emission and/or discharge statistics.

The management system recognizes there is a breaking point when an ecological and human system may not support growth at all levels within a supplier network; there will be winners and losers. It is the position of ITT to maintain their production base and therefore their economic performance in the short and long-term.

The accounts concept is ultimately aimed at the overall industry sector. As a step toward this goal the accounts have been accepted by a third party registrar for inclusion within ISO 14001 certification.

## **12.4 CONCLUSION**

In the end, CEDM allows for a wide variety of innovative solutions, by which the professional can influence sustainable development in the United States. The general consensus on sustainability thinking among professionals has historically been based solely on regulatory compliance. CEDM is an opportunity to incorporate the past paradigm and move beyond to a broader understanding and application of sustainability.

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<sup>105</sup> The automotive industry has not established any criteria nor has it developed any ranking to judge the fitness of an EMS to meet any type of sustainability. Since this is the case this situation cannot represent a rational whole in so far as any negative feedback from the system would be limited to interactions from only one element of the system. There is however negative feedback mechanisms inherently incorporated into the system through customer supplier environmental requirements, i.e. restricted materials standards. Additional mechanisms associated with recyclability, recycled materials use, parts markings and substances of concern will strength this requirement of rational ecology in the future. If the capital supporting these mechanisms, i.e. contribution to ecosystem waste assimilation, protective and protective capacity where to surface through environmental policy, the market and/or the ultimate consumer negative feedback would increase in quality.

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#### ADDITIONAL CONTACTS MADE DURING THIS RESEARCH

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## APPENDIX

### LAWS, REGULATIONS AND STANDARDS

The following key environmental laws form the system of environmental regulation in the United States. There are at least as many additional acts that effect the environment to lesser degrees. These laws by direct quote or influence to the research text serve to define the United States regulatory scene.

**CLEAN AIR ACT** of 1970 (CAA), 1977 (P.L. 95-95) provide for the protection and enhancement of air quality through the regulation of pollutant emissions and establishment of air quality standards. As amended by P.L. 95-190, November 16, 1977; P.L. 95-623, November 9, 1978; P.L. 96-209, March 14, 1980; P.L. 96-300, July 2, 1980; P.L. 97-23, July 17, 1981; P.L. 97-375, December 21, 1982; P.L. 98-45, July 12, 1983; P.L. 98-213, December 8, 1983; P.L. 100-202, December 22, 1987; the Clean Air Act Amendments of 1990; P.L. 101-549, November 15, 1990; and P.L. 102-187, December 4, 1991.

**CLEAN WATER ACT** (1977) (P.L. 95-217) to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Officially named the Federal Water Pollution Control Act it was amended by the Clean Water Act of 1977 and is commonly known as the Clean Water Act. The Federal Water Pollution Control Act was enacted by P.L. 92-500, October 18, 1972, and amended by P.L. 93-207, December 28, 1973; P.L. 93-243, January 2, 1974; P.L. 93-592, January 2, 1975; P.L. 94-238, March 23, 1976; P.L. 94-273, April 21, 1976; P.L. 94-558, October 19, 1976; P.L. 95-217, December 28, 1977; P.L. 95-576, November 2, 1978; P.L. 96-148, December 16, 1979; P.L. 96-478 and P.L. 96-483, October 21, 1980; P.L. 96-561, December 22, 1980; P.L. 97-35, August 13, 1981; P.L. 96-510, December 11, 1981; P.L. 97-117, December 29, 1981; P.L. 97-164, April 2, 1982; P.L. 97-216, July 18, 1982; P.L. 97-272, September 20, 1982; P.L. 97-440, January 8, 1983; P.L. 98-45, July 12, 1983; P.L. 100-4, February 4, 1987; and P.L. 100-202, December 22, 1987; P.L. 100-404, August 19, 1988; P.L. 100-688, November 18, 1988; P.L. 101-144, November 9, 1989; P.L. 101-380 (Oil Pollution Act of 1990), August 18, 1990; P.L. 101-596 (Great Lakes Critical Programs Act of 1990), November 16, 1990; P.L. 102-104, August 17, 1991; P.L. 102-240, December 18, 1991; P.L. 102-389, October 6, 1992; and P.L. 102-580, October 31, 1992.

**COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT** of 1980 (CERCLA) (P.L. 96-510) establishes a program to mitigate releases of hazardous waste from inactive hazardous waste sites that endanger public health and the environment. As amended by P.L. 97-216, July 18, 1982; P.L. 97-272, September 30, 1982; P.L. 98-45, July 12, 1983; P.L. 99-160, November 25, 1985; P.L. 99-499 (Superfund Amendments and Reauthorization Act of 1986), October 17, 1986; P.L. 100-202, December 22, 1987; P.L. 100-144, November 9, 1989; P.L. 101-508, November 5, 1990; P.L. 101-584 (Superfund Security Bonding), November 15, 1990, P.L. 102-389,

October 6, 1992, and P.L. 102-426, October 19, 1992.

**EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT of 1986** (Title III of the Superfund Amendments and Reauthorization Act, P.L. 99-499, as amended by P.L. 102-389, October 6, 1992) establishing emergency response structures, and industry safety and reporting guidelines.

**FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT of 1982 (FIFRA)** (P.L. 92-516) requires that all pesticides used in the U.S. must be registered with and classified by EPA for general or restricted use. As amended by P.L. 94-51, July 2, 1975; P.L. 94-109, October 10, 1975; P.L. 94-140, November 28, 1975; P.L. 95-251, March 27, 1978; P.L. 95-396, September 30, 1978; P.L. 96-539, December 17, 1980; P.L. 98-201, December 2, 1983; P.L. 98-602, November 8, 1984; P.L. 100-202, December 22, 1987; P.L. 100-532, October 25, 1988, and P.L. 101-624, November 28, 1990

**MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT of 1972** (P.L. 92-532) regulates the dumping of materials into the ocean waters.

**NATIONAL ENVIRONMENTAL POLICY ACT of 1970** (P.L. 91-190) established a national policy for the environment and provided for environmental impact statements and environmental consideration in all federal actions. As amended by P.L. 94-52, July 3, 1975; P.L. 94-83, August 9, 1975; P.L. 99-160, November 25, 1985; P.L. 100-202, December 22, 1987; P.L. 100-404, August 19, 1988; P.L. 101-144, November 9, 1989, and P.L. 102-389, October 6, 1992.

**OCCUPATIONAL SAFETY AND HEALTH ACT of 1970 (OSHA)** (P.L. 91-596) establishes worker safety requirements and operational standards. As amended by P.L. 93-237, January 2, 1974; P.L. 95-251, March 27, 1978; P.L. 97-375, December 21, 1982; P.L. 98-139, October 31, 1983; P.L. 98-620, November 8, 1984; P.L. 99-499, October 17, 1986; P.L. 100-202, December 22, 1987, P.L. 101-508, November 5, 1990; and P.L. 102-550, October 28, 1992.

**OIL POLLUTION ACT of 1990** (P.L. 101-380) provides oil pollution liability and compensation. As amended by P.L. 102-389, October 6, 1992.

**POLLUTION PREVENTION ACT of 1990** (P.L. 101-508, November 5, 1990), as amended by Public Law 102-389, October 6, 1992. Establishes a pollution prevention hierarchy as a national policy, authorization of EPA activities and modifications of public reporting.

**SAFE DRINKING WATER ACT of 1974** (P.L. 93-523) requires standards and regulations to be established for drinking water applicable to public water systems. As amended by P.L. 94-317, June 23, 1976; P.L. 94-484, October 12, 1976; P.L. 95-100, November 16, 1977; P.L. 96-63, September 6, 1979; P.L. 96-502, December 5, 1980; P.L. 98-620, November 8, 1984; P.L. 99-339, June 19, 1986; P.L. 100-572, October 31, 1988, and P.L. 100-389, October 6, 1992.

**SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT of 1986 (SARA)** (P.L. 99-499, October 17, 1986) added many provisions to CERCLA and clarified much of what was unclear in the original act.

**TOXIC SUBSTANCES CONTROL ACT of 1976** (P.L. 94-469) controls hazardous chemical substances, excluding pesticides, in the marketplace and provides for authority to require the testing of a chemical's toxicity. As amended by P.L. 97-129, December 29, 1981; P.L. 98-80, August 23, 1983; P.L. 98-620, November 8, 1984; P.L. 99-519, October 22, 1986; P.L. 100-11, March 17, 1987; P.L. 100-202, December 22, 1987; P.L. 100-368, July 18, 1988; P.L. 100-551, October 28, 1988; P.L. 100-577, October 31, 1988; P.L. 101-144, November 9, 1990, and P.L. 102-550, October 28, 1992.

The following are additional environmental laws enacted in the United States between 1969 and 1992.

**ALASKA NATIONAL INTEREST LANDS CONSERVATION ACT OF 1980.** Protected 102 million acres of Alaskan land as national wilderness, wildlife refuges, and parks.

**COASTAL ZONE MANAGEMENT ACT OF 1972.** Authorized federal grants to the states to develop coastal zone management plans under federal guidelines.

**ENDANGERED SPECIES ACT OF 1972.** Broadened federal authority to protect all "threatened" as well as "endangered" species; authorized grant program to assist state programs; required coordination among all federal agencies.

**ENERGY POLICY ACT OF 1992.** Purpose is to encourage more efficient use of energy and water by improving conservation and energy efficiency in homes, offices, federal buildings, appliances, water fixtures, energy consuming industries and electric and gas utilities.

**FEDERAL LAND POLICY AND MANAGEMENT ACT OF 1976.** Gave Bureau of Land Management authority to manage public lands for long-term benefits; officially ended policy of conveying public lands into private ownership.

**FOOD SECURITY ACT OF 1985 (THE FARM BILL).** Limited federal program benefits for producers of commodities on highly erodible land or converted wetlands; established a conservation reserve program; authorized Agricultural Department technical assistance; and revised and extended the Soil and Water Conservation Act of 1977 through the year 2008.

**GLOBAL CLIMATE PROTECTION ACT IF 1987.** Authorized the State Department to develop an approach to the problems of global climate change.

**MARINE PROTECTION ACT OF 1972.** Regulated dumping of waste materials into the oceans and coastal waters.

**NATIONAL FOREST MANAGEMENT ACT OF 1976.** Gave statutory permanence to national forest lands and set new standards for their management; restricted timber harvesting to protect the soil and watersheds; limited clearcutting.

**NUCLEAR WASTE POLICY ACT OF 1982.** Established a national plan for the permanent disposal of highly radioactive nuclear waste and authorized the Energy Department to site, obtain a license for, construct, and operate geologic repositories.

**OCEAN DUMPING ACT OF 1988.** Amended the Marine Protection, Research and Sanctuaries Act of 1972 to end all ocean disposal of sewage sludge and industrial waste by 1991; revised EPA regulation for ocean dumping; established fees and violations.

**PUBLIC UTILITY REGULATORY POLICIES ACT OF 1978.** Provided for Energy Department and Federal Energy Regulatory Commission regulation of electric and natural gas utilities and crude oil transportation systems in order to promote energy conservation and efficiency; allowed small cogeneration and renewable energy projects to sell power to utilities.

**SURFACE MINING CONTROL AND RECLAMATION ACT OF 1977.** Established environmental controls over strip mining on farmland, alluvial valleys, and slopes; required restoration of land to original contours.

The following are International Quality Management and Environmental Management Systems and Standards referenced in the text, or otherwise providing additional reference source.

**ENVIRONMENTAL MANAGEMENT SYSTEMS (BS 7750 : 1994),** British Standard first published March, 1992. Prepared under the direction of the Environmental Management Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on January 15, 1994. British Standards Institute, 2 Park Street, London W1A 2BS.

**GUIDE TO QUALITY SYSTEMS AUDITING (BS 7229 : 1991)** Prepared under the direction of the Environmental Management Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on January 15, 1994. British Standards Institute, 2 Park Street, London W1A 2BS.

**QUALITY SYSTEMS (BS 5750 : Part 1 : 1987),** British Standard first published 1987, it is envisaged that BS 5750 : Part 1: 1987 will be superseded by a new edition during 1994. Prepared under the direction of the Environmental Management Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on January 15, 1994. British Standards Institute, 2 Park Street, London W1A 2BS.

**QUALITY SYSTEMS REQUIREMENTS FOR ENVIRONMENTAL PROGRAMS (ANSI/ASQC E4-19xx)** Sponsor: American Society for Quality Control; Energy and Environmental Quality Division; Environmental Issues Group. May, 1993. Draft - Do Not Cite or Quote, ASQC/ANSI Approval Pending. Technical Committee 176's Vision 2000 document prepared by the Strategic Advisory Group for the Environment (SAGE) was established by the International Organization for Standardization and the International Electrotechnical Committee (IEC) in 1991 to make recommendations regarding international standards for the environment.

**QUALITY SYSTEMS (ISO 9000)** series of five standards ISO 9000-9004, written by the Technical Committee (TC) 176 of the International Organization for Standardization (ISO).

**ENVIRONMENTAL MANAGEMENT STANDARDS (ISO 14000)** series of environmental standards. ISO 14001 Environmental Management System First Edition 1996-09-01, ISO 14004 Environmental Management Systems General Guidelines on Principles, Systems, and Supporting Techniques, ISO 14010 Guidelines for Environmental Auditing General Principles, ISO 14011 Guidelines for Environmental Auditing Audit Procedures Auditing of Environmental Management Systems.