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The Political Economy of Environmental Impact Assessment:

Interest Groups, Uncertainty and Transactions Costs

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I. INTRODUCTION

Economic models describing interest group behavior and its implications for decision making and economic performance constitute relatively new extensions in the domain of economic theory. Considerable research effort has been focused on the economic factors that influence interest groups to organize and pursue favorable policy decisions.[1] Once organized, the interplay between interest groups may be understood in terms of game strategy, which is governed by the coordinating mechanisms inherent in institutional arrangements.[2] Under certain conditions, transactions costs are of a magnitude that effectively stymies decision making.[3]

Natural resource economists have been quick to adopt and utilize particular aspects of these theories in an applied context. To date, much of the literature has focused on the self interested behavior of natural resource managers as expressed through agency action.[4] Rarely, however, are the full range of interests involved in natural resource decisions and their interactions addressed. Moreover, this theoretical base has never been brought to bear on the most influential natural resource policy combination of our time: The National Environmental Policy Act (NEPA) and the Environmental Impact Statement (EIS) process. NEPA and the EIS process have received much attention, but not in the context of the economic models cited above.[5]

The National Environmental Policy Act and the Environmental Impact Statement process are important subjects for academic inquiry because they constitute the most pervasive natural resource policy innovation in recent

decades. This policy combination dominates substantive outcomes in natural resource preservation and development. Because the economic and environmental tradeoffs involved are often substantial, decisions based on the NEPA/EIS framework promise to have a significant influence on the quality of life and choices open to both current and future generations.

The objective of this paper is to examine the EIS process in the context of game strategic behavior by interest groups and the coordinating function of decision rules. The transactions costs arising out of existing institutional arrangements are of particular interest. It is important to note from the outset that the analysis focuses on the process guiding decision making rather than the substantive decisions arising out of the EIS process. Attention to process is couched in the view that the exceedingly complex and important substantive decisions made pursuant to NEPA must not be further encumbered by processes that encourage unproductive uses of information and human resources.

The format of the paper is as follows: Section II discusses the characteristics of NEPA and the EIS process that make them suitable for analysis in terms of interest group theory. In the regard, a brief background into the purpose of NEPA and the evolution of the EIS process into participatory mechanism is presented.

Section III of the paper provides an overview of economic theory that predicts the type of interest groups likely to organize and participate in the EIS process. In general interest groups will not mirror the general public. Section III also models the distinct objectives of the typical range of interests involved in the EIS process. It becomes clear the problem is one of fundamental conflict in value systems.

In section IV, the interplay of organized interest groups is addressed. The critical role of uncertainty in allowing game strategic behavior to develop is discussed. Strategic use of information combined with the veto power implicit in participatory decision making may produce unprecedented transactions costs and threaten to stymie decision making.

Throughout sections III and IV the Metropolitan Denver Systemwide Environmental Impact Statement (MDSEIS) is used as an example in order to lend concreteness to the arguments set forth. This case is particularly enlightening on the subject of transactions costs since it has become the most costly and time consuming of its kind in the history of the U.S.[6]

Section V concludes the paper with an exploration of policy implications. A research agenda is outlined that holds promise in determining institutional arrangements capable of reducing transaction costs and facilitating natural resource decisions pursuant to NEPA.

II. THE PARTICIPATORY NATURE OF THE EIS PROCESS

It is clear that the intent of the National Environmental Policy Act of 1969 is to achieve balance among competing interests by requiring due consideration of both economic and environmental concerns in decision making.[7] That is, NEPA is concerned with the general problem of fostering compromise rather than aimed at particular substantive outcomes. This period in natural resource policy lies well within the age of scientific management and rational planning.[8] Accordingly, it was generally believed that solid information on environmental effects, gleaned from the EIS process, would facilitate such compromise.

In order to facilitate the EIS process as an action forcing mechanism,

and to rectify the dubious ability of agencies for "self-policing", Congress made the procedural provision that environmental agencies be consulted and that their comments accompany a formal EIS.[9] In addition, the threat of litigation was also sanctioned as a procedural element that would promote due consideration of environmental effects in impact assessment. However as stated by Dreyfus and Ingram:

> "In the early years of implementing the requirement for impact statements . . . developments occurred which transformed them from a force operating from inside program administration (as anticipated by the original drafters) to a force exerted from outside by interest groups and courts."[10]

The EIS process became infused with the reality of participatory decision making. Rather than being an explicit intent of NEPA, participatory decision making emerged on its own accord. The number of parties involved expanded beyond agency officials to very specific and often fragmented interest groups. Interest group activities, rather than being peripheral, have become central to, and may in fact dominate, the EIS process.

The transformation of the EIS process reflects a general move toward participatory decision making in the U.S. Wengert argues that the goal of participation has been alternatively characterized as (1) good policy in itself; (2) strategically advantageous; (3) essential to communication; (4) useful in conflict resolution and (5) therapeutic in rectifying social alienation.[11] Despite its role in U.S. policy making, Wengert concludes that there is no coherent body of theory that explains either the normative or empirical significance of participatory decision making.

The evolution of the EIS process into a participatory framework means inquiry into its performance must include an analysis of interest groups and their behavior. Given that NEPA/EIS was instituted to facilitate compromise among diverse objectives held by various interests, it is relevant to question whether controversy and conflicts have moderated or intensified. Does the EIS process facilitate achievement of a reasonable balance among competing interests? Does the process itself constitute a reasonable means to achieve this end? As explained in the following sections, the decentralized, participatory mechanism through which an EIS is developed, while not the explicit intent of NEPA, is crucial in terms of the size and magnitude of transactions costs associated with an EIS.

III. THE INCENTIVE STRUCTURE ASSOCIATED WITH ENVIRONMENTAL IMPACT STATEMENTS

Understanding the objectives sought by various interest groups and their attempts to organize and influence political decisions is critical in explaining the performance of the EIS process. The logic of collective action and rent seeking theory have high descriptive relevance in this regard.[12] This section traces through these arguments as they apply to the EIS process. The Metropolitan Denver Systemwide Environmental Impact Statement (MDSEIS) is used for illustrative purposes.[13]

In the Logic of Collective Action Mancur Olson explained the impetus for individuals to organize in order to express economic or political power.[14] Two key factors that figure in the success of individuals in organizing formal interest groups are (1) expected benefits, i.e., the

magnitude of value at stake for each individual and (2) the transactions costs associated with organization itself.

Benefit/cost analysis can be used to demonstrate that formal organizations are likely to exist for specialized groups with high expected benefits and few members. Similarly, the most zealous individuals in a group will tend to become leaders. The typical structure of benefits and costs can account for the existence of many "special" interest groups and relatively few "public" interest groups, as evidenced in the EIS process as well as many other political arenas. In the case of the MDSEIS, this assertion is corroborated by the fact that at public meetings, 90 percent of the attendees represented special interests whereas only 10 percent identified themselves as part of the general citizenry.[15]

The logic of collective action suggests that interest groups will not mirror public values based on either "one person equals one vote" (a political model) or "one dollar one vote" (an economic model). Which notion of value is used by decision makers in assessing an EIS has dramatic implications for particular decisions. For example, assume an EIS involves (1) constructing a dam which will yield net water sales of $400,000.00 to each of 5 developers totaling $2,000,000.00 or (2) preserving the river for rafting so 10,000 people enjoy recreation valued at $100.00 for a total of $1,000,000.00. In this simple example, a decision maker assigning value according to a "one person equals one vote" rule would support the second option. The same decision maker valuing according to the "one dollar equals one vote" rule would favor the first alternative. It is not clear which decision would be appropriate assuming decision makers wish to reflect the values of all interested parties.

Rent seeking theory is useful in explaining the behavior of interest groups once they are organized. This model relies on application of utility theory in the context of political decision making rather than market exchange. Interest groups are simply assumed to exhibit rational political behavior in pursuit of specified objectives. That is, they will seek decisions or regulations that benefit them directly, even at the expense of other interest or efficiency in general.[16] Given a solid notion of the objectives and decision rule faced by participants, rational behavior can be routinely deduced.

The insight of the analyst is most critical in specifying the specific objectives that govern the a particular case. The following paragraphs outline the typical range of interests involved in EIS statements, distinguished both in terms of location and ideology. The interest groups and objectives relevant to the Metropolitan Denver Systemwide Environmental Impact Statement (MDSEIS) are used for illustrative purposes.

Environmental Interests

Environmentalists have a (largely negative) stake in large scale development (structural water development in the MDSEIS). Because their value systems are considerably different it is useful to define two categories of environmentalists: (1) recreationists and (2) preservationists. The distinction among environmentalists is important because the two views would lead interest groups to take very different strategies in the EIS process.

As defined here, recreationists' value changes in the environment in anthropocentric terms. That is, all environmental factors are assessed in terms of their contribution to, or deterioration of, the quality of human

life. In the case at hand, the loss of rafting and fishing opportunities as well as aesthetic resources, are of particular importance. New recreation opportunities afforded by reservoir development would be included as positives in a recreationist's impact assessment. Conceivably, most of the costs and benefits involved could be monetized through estimation of willingness to pay.

Preservationists focus on intrinsic or biocentric rather than anthropocentric value. Preservationists argue that species of plant and animal life, as well as geological sites have value regardless of their impact (or lack of impact) on human utility. This view is effectively a no growth or minimum interference objective. Therefore, any sort of development is opposed on principle. Only the recreation alternatives based on low density, unmechanized resource use are valued by this group.

Local Development Interests

Local development interests, usually misconceived as coherent, are also key to the interest group dynamics of the EIS process. In most cases development interest are diverse; there is more intra-group competition and disagreement than commonly believed. Divisions within the general group usually depend on relative economic pressures for development within political jurisdictions.

A distinction between development interests, critical to understanding the MDSEIS, and relevant to many natural resources issues, is the difference between city and suburban interests. In the case at hand, virtually all new water demand originates in the suburbs, while the bulk of transmission and treatment infrastructure, as well as actual water rights and technical expertise is owned by the city of Denver proper.

Municipal boundaries make for an interesting, if not consistent relationship between entities. Certainly, one can expect the city and suburbs to be allied against environmental groups and others who oppose development. However, when the issues changes from the goal of development to the means of development, municipalities are often transformed from allies to adversaries. Regardless of their cohesion on the desirability or inevitability of growth and development per se, cities and suburbs usually have serious disagreements on the particulars of development, which is part of a larger, running battle.

Power and independence are often valued in themselves and weighed against cost considerations. Consider the degree of cooperation in transmission and treatment of water. Do economies of scale and the flexibility of an integrated system warrant centralized management by Denver through contractual arrangement with the suburbs? Or is the independence of individual suburban municipalities valuable enough to forego the cost advantages mentioned. Should suburbs "trust" Denver to pursue the lowest-cost water option or would they be wise to withdraw from cooperation and pursue independent water supply alternatives (perhaps transfers from agriculture).

Very often cities enjoy a tradition of leadership and power. City officials may make an effort to maintain status and control in development decisions, despite the fact of declining need in their own jurisdiction. Cities often pay the price by becoming the quintessential adversary, attacked by environmentalists and suburbs alike. Relative to suburbs, the city proper may bear the burden of extreme visibility and scrutiny even when the city's actual stake in the decisions are relatively small.

If the city proper assumes the role of water developer, which, of an infinite number of financial arrangements, will be pursued? Certainly, the financial positions of individual jurisdictions motivate development interests. Will development costs be financed through new taxes (impacting housing developers and future residents concentrated in the suburbs) or via rate increases (whereby all current residents share the burden of growth). If the city subsidizes water development needed for the suburbs, should the suburbs reciprocate by contributing to city hospitals and museums? Due to the fact that political boundaries rarely match impact boundaries, the issues associated with natural resource development become political chips in the full spectrum of issues facing cities and suburbs dealing with growth and the environment.

Local Resource Competitors

In any natural resource decision, there will likely be local resource competitors who have some stake in development by another use type. In general, the position of resource competitors depends on current and expected future economic circumstances. The following paragraphs illustrate the principle using the example of agriculture, a direct water resource competitor on the Front Range of Colorado.

Assuming farmers wish to maximize profits, they will use a resource as long as its marginal contribution to revenue exceeds its cost. In the presence of urban growth, and the absence of water development, water will likely be bid out of agriculture into municipal use. If farmers sell water voluntarily, then by definition, individual farmers will be fairly compensated. Even so, water may transfers contribute to the decline in associated businesses who are not party to the transaction.

Farmers encourage water development insofar as it contributes to their profitability. However, their incentives depend on macroeconomic circumstances. During boom periods, farmers may wish to expand and obtain additional water at relatively low cost and therefore would support development. In recessionary periods, some may wish to sell water rights to relieve financial burden. Under these conditions, individual farmers may oppose water development in the hope that their property may become more attractive to buyers.

Regional Development Interests

Typically there are other communities within a region (as defined by impact boundaries) that are indirectly impacted by the proposed actions addressed in an EIS. Neoclassical economists often exclude consideration of indirect (secondary) economic effects, because under certain conditions (i.e., full employment) secondary impacts effect the distribution of benefits and costs but not net gain. However, from an interest group perspective, the distribution of the regional economic pie is more important than its size.

In the MDSEIS, regional development interests are typified by Western slope water interests. This group supports development in general but their main concern is with the distribution of growth. In concrete terms, both agricultural and municipal interests on the Western slope are concerned that immediate water development by metro-Denver will hamper future development in their region of the state.

This argument could also be extended to other states within the Colorado River region. Certainly as a potential competitor, California has a stake in water development in Colorado insofar as it lessens or enhances

water related opportunities for California in the future. The single factor that characterizes regional development interests is that their objectives include consideration of secondary as well as primary net benefits from future water development.

Summary

Formally, the simple model of objectives pursued by interest groups typically involved in the EIS process can be represented as follows:

$$(1)\quad U^{E}j = f(\sum_{i=1}^{n} g_i,\ r_m)$$

where,

U^E = utility of environmentalists of type j, where j = 1, 2 and 1 = recreationists and 2 = preservationists

g = growth in jurisdiction i = 1...n

r = recreation opportunities of type m, where m = 1, 2 and 1 = mechanized and/or high density and 2 = unmechanized, low density.

Clearly,

$$\frac{\delta U^{E}1}{\delta g_i} = 0 \qquad \frac{\delta U^{E}1}{\delta r_1} > 0 \qquad \frac{\delta U^{E}1}{\delta r_2} > 0$$

$$\frac{\delta U^{E}2}{\delta g_i} < 0 \qquad \frac{\delta U^{E}2}{\delta r_1} < 0 \qquad \frac{\delta U^{E}2}{\delta r_2} > 0$$

$$(2)\quad U^{D}i = v\ (g_i,\ k_i,\ e_i)$$

where,

U^Di = utility of development officials in jurisdiction

g_i = growth in jurisdiction i including secondary impacts

k_i = jurisdictional power/independence

e_i = excess of municipal revenues over expenditures in region i

In this case,

$$\frac{\delta U^{D}_{i}}{\delta g_{i}} > 0 \qquad \frac{\delta U^{D}_{i}}{\delta j_{i}} > 0 \qquad \frac{\delta U^{D}_{i}}{\delta e_{i}} > 0$$

(3) $U^{C} = w\ (p)$

where,

U^{C} = utility of resource competitor

p = price of resource

And:

$\frac{\delta U^{C}}{\delta p} > 0$ under circumstances of industry contraction

$\frac{\delta U^{C}}{\delta p} < 0$ under circumstances of industry expansion

Section II yields two key insights. First, the range of goals sought by the interest groups involved in the EIS is extremely diverse. Equation (2) in itself captures the diverse goals of city, suburban and regional developers distinguished by location. Insofar as objectives reflect value systems, it is clear that interest groups are involved in a fundamentally moral disagreement.

Second, in accordance with the logic of collective action, organized interest groups will not mirror the general public, in terms of either "one person equals one vote" nor "one dollar equals one vote". Organized interest will tend to represent "special" rather than "public" interests. Moreover, because of their perception of the stakes involved, the most zealous individuals tend to hold disproportionate power within interest groups. Moderates rarely become leaders.

A clear understanding of the structure of interest groups and their diverse objects is the first step in understanding the performance of the

EIS process. The next section focuses on strategic behavior by organized interest groups and their interplay in the context of the EIS process. The role of information is central in this regard. Uncertainty allows interest groups to transform a fundamentally moral disagreement into factual dispute. A contest of wills becomes a contest of information.

IV. STRATEGIC USE OF INFORMATION AND TRANSACTIONS COST

NEPA and the EIS process are intended to reduce uncertainty by improving information about economic and environmental tradeoffs. Ironically, as this section explains, the interplay among interest groups in the EIS process actually serves to promote increasingly divergent views on factual matters. Although thoroughly unintended, uncertainty and transactions costs may increase dramatically. Uncertainty comes into play via an unavoidable element in impact assessment: forecasting. Successful planning, indeed the choice as to the appropriate mix of preservation and development depends directly on one's vision of the future.

In the case of the MDSEIS, impact assessment depends heavily on forecasts of population growth and distribution, water conservation potential (elasticity of demand), and water supply available through nonstructural means (primarily via exchanges and transfers of water out of agriculture). Each of these factors is critical to an assessment of the "appropriate" level of development and associated environmental damage. Unfortunately these elements are impossible to foresee with absolute accuracy.

The principle of diminishing marginal returns applies to forecasting. In the limit, additional time and effort devoted to forecasting does not guarantee any improvement in accuracy or certainty. In the final analysis, one can not unequivocally prove or disprove many estimates key to the decision. If the problem were one of risk rather than uncertainty, expected values could be calculated and used to guide decision makers according to whether they are risk averse, neutral or risk seeking. Unfortunately in most cases probability distributions do not exist.

Uncertainty in forecasting creates the opportunity for interest groups to strategically manipulate information. Each interest group may fabricate scenarios of the future that supports their particular position. Moral arguments are transformed into disagreements regarding the "facts". Contrary to popular belief, additional information does not necessarily increase knowledge or understanding. This section argues that uncertainty and the potential for manipulation constitute crucial elements in producing the enormous transactions costs often associated with impact assessments.

Strategic use of information by interest groups often manifests itself in the EIS process in the form of (1) information overload and (2) adversarial use of extreme alternatives. These two strategies are bound to create transactions costs in the form of expense and delay. Of ultimate importance, the transactions costs that result may be of a magnitude that threatens to stymie decision making consonant with the policy intent of NEPA.

Information Overload

Ironically, in pursuit of certainty about the impacts of natural resource decision, the EIS process often results in information overload

which may in fact increase uncertainty. Creators of NEPA legislation never foresaw, nor intended to require, the voluminous dissertations that typify impact statements today.[17] The quantity of information available to an EIS is not limited; its quality is. In fact, quantity itself may become a problem insofar as it may obscure the most relevant data and contributes to confusion and delay.

The factors contributing to information overload are directly attributable to the incentive structure faced by interest groups and the rules governing their interaction. In general, information overload reflects the diversity of interests involved and each group's desire to have all viewpoints favorable to their position presented and considered. In this sense information overload reflects the complexity of the conflict. The problem is compounded by the fact that an EIS may require "comprehensive analysis" of alternatives. Coupled with the threat of litigation, this standard serves to reinforce the tendency towards information overload.

However, basic conflict alone is not enough to produce information overload. It must be fueled by uncertainty. Uncertainty serves to magnify the conflict among interest groups by allowing information to multiply through manipulation. By combining a set of forecasts that reflect their view of the world, interest groups can manufacture "definitive" scenarios of the future and "prove" the appropriate level of development. Technical support for such scenarios can be garnered because experts themselves disagree due to objective considerations, personal convictions, and the "marketplace for ideas". The "marketplace for ideas" refers to professionals who supply the theoretical support for any idea that demands

a high enough asking price. In this case the objective is to provide information for a particular argument rather than an objective quest for "truth".

The demand for particular types of information explains why a new set of interests, dependent only on the EIS process itself, emerges. Consultants, and the technicians charged with obtaining forecasts (specifically, forecasts favorable to their employer) become a new interest group. Assuming the objective of consultants is to maximize income, and given compensation is usually related to time spent, the impetus to engage in protracted and complicated studies becomes clear.

Experts find it even easier to discredit estimates put forth by opposing interest groups than it is to fabricate an original estimate. Because forecasting is inherently uncertain, the implicit rewards in analysis are for "informed skepticism". An expert is bound to promote his/her reputation by questioning estimates rather than by positing answers.

Due to uncertainty, there is no limit to the rounds of criticism and refutation interest groups and their hired technicians can impose upon each other. Impact assessment becomes a reiterative process of massaging forecasts and constructing assumptions that produce "facts" that support a group's preferred position while exposing the estimates of others to a barrage of criticism emphasizing their weakness.

Because, as with most monumental developments, scientists don't have the option to conduct and repeat objective experiments that will lay some assertions to rest, the disagreements are essentially unresolvable and throw doubt on the full range of information attendant to the EIS process.

Instead of reducing uncertainty, the proliferation of estimates exacerbates the information problem. Decision making becomes bogged down in information overload. Considerable time and expense must be devoted to developing, cataloging and criticizing information. In short, transactions costs explode.

Support of Extreme Scenarios

The second way in which game strategic behavior manifests itself is in the adversarial rather than cooperative stance taken by interest groups, especially in the form of supporting extreme rather than moderate scenarios depicting the future. Unfortunately, this is in direct opposition to the purpose of NEPA which is to promote compromise.

This strategy may be understood in terms of the standard payoff matrix associated with noncooperative game models.[18] The payoff matrix relevant to a typical EIS process is shown in Figure 1. For simplicity, only two interest groups are represented but the model is applicable to the n group case. Using 0 as a base utility level for mutual compromise (NEPA's preferred outcome), the remaining possibilities can be evaluated on ordinal grounds.

		Position taken by Environmentalists	
		Compromise	Extreme
Position Taken By Developers	Compromise	(0, 0)	(--, ++)
	Extreme	(++, --)	(-, -)

Figure 1. Payoff Matrix Relevant to the EIS Process.

If developers take an extreme position and environmentalists compromise, developers benefit and environmentalists suffer relative to mutual compromise. The reverse case also applies. If both groups take extreme positions, delay results and both groups lose relative to compromise insofar as all interests are left with considerable time and money invested with no indication, much less any guarantee that any eventual decision will be to their liking.

A more precise definition of preference for extremism would involve weighing expected benefits/costs of development against the expected benefits/costs of preservation, minus the costs associated with delay itself. In any case, as the transactions costs associated with achieving a final solution rise, the payoff associated with taking an extreme position declines.

For developers one would expect the resulting preference order to be R^D (++, --) > R^D (0, 0) > R^D (-, -) > R^D (--, ++). For environmentalists, the preference order is R^E (--, ++) > R^E (0, 0) > R^E (-, -) > R^E (++, --). Despite the desirability of compromise from a aggregate point of view, extremity is rational for the individual. This is the classic prisoners' dilemma. This game leads to the Pareto inferior stable equilibrium of (-, -).

Again, it is uncertainty that allows interest groups to garner support for extreme scenarios. Typically, several forecasts must be combined in order to generate a scenario depicting future conditions and their implications for resource use. Interest groups can construct extreme scenarios by using the high or low estimate for <u>each</u> key forecast. Compilation of several extreme estimates compounds the extremity in the

final scenario.

For example, in the draft MDSEIS, a set of forecasts have been produced for population growth, conservation and nonstructural water supply.[19] Forecasts of unconstrained water demand (due to population growth), range from 190,300 acre feel (a.f.) to 223,900 a.f. Estimates of potential conservation range from 15,000 a.f. to 99,000 a.f. And yields from nonstructural supplies (transfers and exchanges) are projected to be anywhere from 23,800 a.f. to 41,800 a.f. These forecasts can be combined to produce scenarios of demand for structural water supplies ranging from approximately 50,000 to 185,000 acre feet in the year 2010.

The resulting four-fold difference in forecasts of water demand to be met through structural means indicates the great uncertainty about Denver's water future, and reflects the relative ease with which interest groups can construct extreme scenarios. The "truth", to be manifest at a much later date, is likely intermediate to these extremes. Extreme positions are also evident in public meetings. Participants are much more likely to espouse an extreme view of future conditions and support severe conservation or all-out development rather than moderate combinations of the two.[20]

Extreme scenarios impose transactions costs on the EIS process because they exacerbate the technical problem of analyzing alternatives. As demonstrated above, the extreme scenarios supported by diverse interest groups have no common denominator for comparison. Adversarial use of extreme scenarios widens rather than narrows the gap between interest groups, and impedes informed decision making.

Transactions Costs

To summarize the preceding paragraphs, fundamental uncertainty allows

interest groups to manipulate information key to an EIS. Manipulation is most often manifest in the form of information overload and support of extreme and adversarial scenarios. The result may be enormous transaction costs in terms of delay and expense. For example, as of late 1987 approximately $40 million and six years time have been devoted to the MDSEIS and the effort remains to be completed.[21] Despite the resources committed to consideration of a full range of alternatives and impacts, interest groups still disagree vehemently as to a reasonable approach to water supply.

In this case (and many like it) interest groups agree on only one thing. The current state of affairs is unacceptable. The divergence in views unmitigated by the EIS is evidenced by the fact that despite substantial input by environmental groups, the Environmental Caucus considers the draft EIS grossly inadequate. Developers, intent on going forward with structural projects, feel the financial strain of the study (funded largely by municipal water providers) and still face the threat of litigation. Clearly, the conflict between interest groups has not been ameliorated by the EIS process. In fact, tensions have heightened.[22]

Game strategic behavior can produce the transactions costs described only under a sufficiently diffuse decision rule. A dictator (exercising the most concentrated decision rule), can ignore interest group input to a large extent. In contrast, transformation of the EIS process into participatory decision making requiring comprehensive analysis, effectively establishes unanimity as a decision rule. Unfortunately, as noted by theorists diverse interests coupled with a unanimity rule allows for "voting by veto" by which any single group can impose and enforce

inaction.[23] Under these conditions, participatory decision making allows strategic behavior to produce transaction costs of a magnitude that promise to stymie decision making.[24]

The problem can be illustrated in the context of Buchanan and Tullock's public choice model.[25] Referring to Figure 2, prior to the advent of NEPA/EIS, the decision rule governing natural resource decisions lay in the range of D_1. Developers exercised considerable discretion (imposing substantial external costs on environmental interests), and incurred low decision making costs.

When an existing decision rule results in pervasive inefficiency or exposes one or more interests to extreme pressure and is perceived as unfair, the impetus for institutional change emerges.[26] Conceivably, NEPA was a reaction to a dictator-like decision rule that was perceived as both

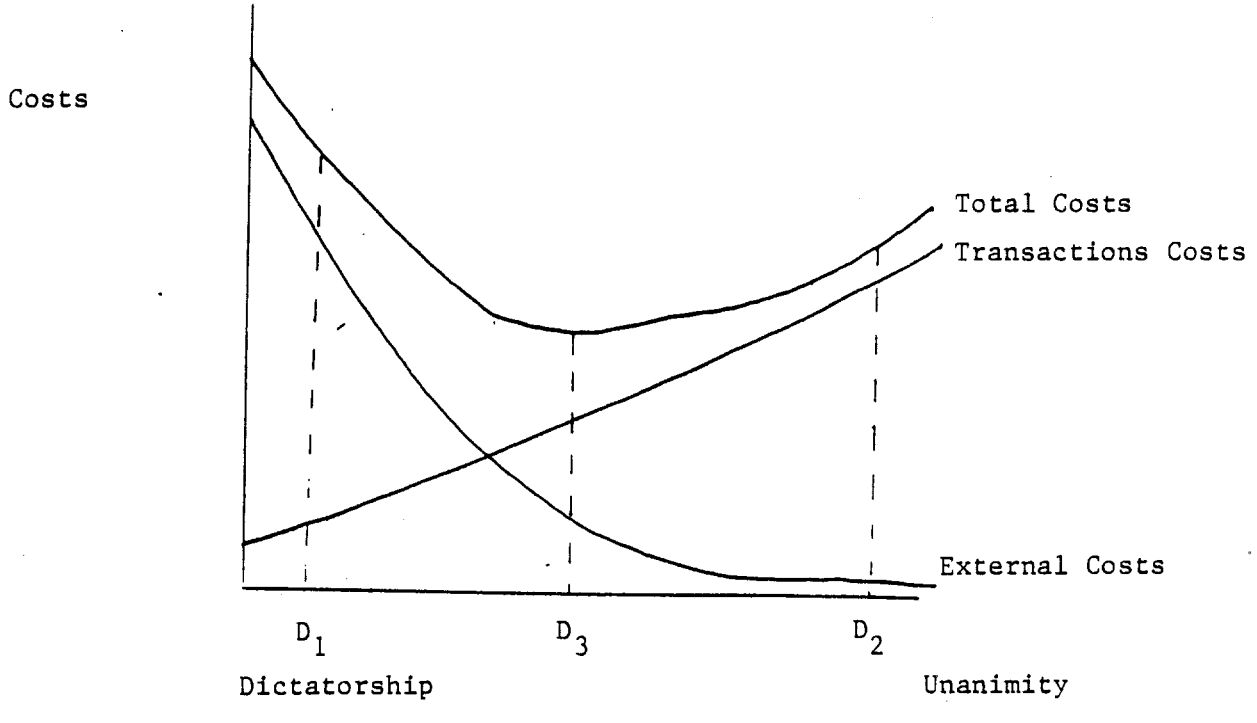

Figure 2. Representative external and transactions costs of alternative decision rules.

inefficient and unfair in terms of the external costs imposed on environmental interests. Unfortunately the "solution" may have become one of the opposite extreme. Although not the explicit intent of NEPA, the EIS process has evolved into a decision rule effectively requiring consensus, like D_2. External costs are reduced but decision making costs (transactions costs) have reached unprecedented heights.

As it stands, some natural resource decisions are burdened with undue pressure, this time in the form of transactions costs. As a result, considerable demand exists for institutional innovation. The next section outlines policy innovations (specific to the MDSEIS and development/preservation decisions in general) that hold promise in balancing the tradeoff between external and transactions costs.

V. POLICY INNOVATIONS

The previous sections explain why, through a combination of rent seeking, uncertainty and broad veto power, the EIS process may produce enormous transactions costs which impede decision making. Rather than fostering the compromise clear in NEPA intent, the positions of interest groups may diverge, rather than converge as a result of the EIS process.

Insofar as the specific form of this institutional arrangement is imposing serious, nonproductive pressure on natural resource decisions and perceived as inefficient and/or unfair, the decision rules and particular policies guiding the process are brought into question. The impetus exists to devise a viable solution to the problem of exorbitant decision making

costs, without imposing undue external cost. The problem becomes one of institutional design. Hurwicz[27] defines the problem as follows:

> "given a social choice correspondence expressing the societal goals or desiderata, find game rules [i.e., an outcome function and a specification of permissible moves (behaviors-messages and actions)] implementing (in a noncooperative game equilibrium sense) that correspondence, subject to the validity of commitments, as well as to restrictions on message space size and on the complexity of computations to be performed by participants. It is, of course, quite likely that only an approximate implementation is possible" (p. 401).

Referring to Figure 2, at first glance one might suggest that a moderate (but more concentrated like D_3) decision rule be innovated because in this case, a rule intermediate between dictatorship and unanimity is cost effective. However, upon closer inspection the general problem is considerably more complex.

First it must be recognized that the nature and incidence of decision making and transaction costs are fundamentally a function of the initial rights structure.[28] For example as defined here, developers have the initial rights, subject to conditions imposed by the EIS. As a result the external costs fall primarily on preservation interests and transactions costs are born by developers. Alternatively however, one may imagine environmentalists have the initial rights (to preservation) whereby developers would bear the external costs of environmentalists decisions and environmentalists would incur the transactions costs of including other parties in the decision. As depicted in Figure 2 not only would the

referent groups switch, one would also expect the shape of these curves to change as well.

Another complicating, but extremely important factor, is that the costs shown are implicitly weighted according to some "social welfare function".[29] That is, policy decisions are made considering the costs that accrue to various groups, and also according to the relative weight society affords each group or type of costs. Conceivably, if dollar costs remain unchanged and the social welfare function shifted (e.g., to assign weight based on number of people versus number of dollars) the effective cost curves would shift and the appropriate decision rule would also change.

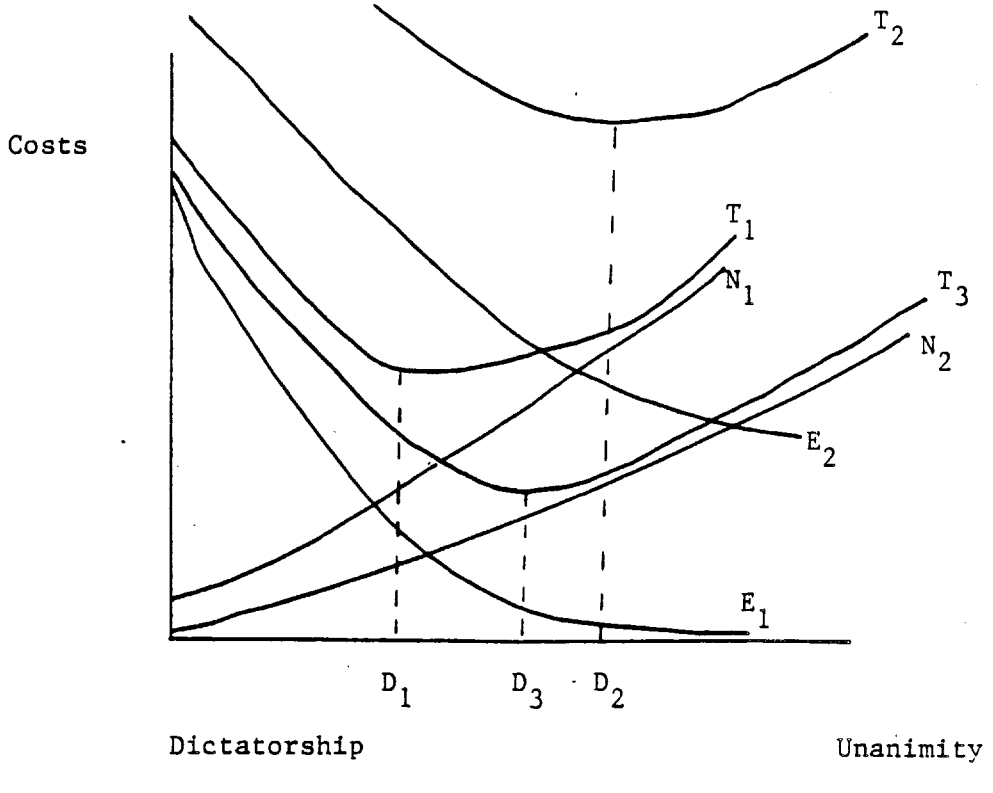

Figure 3. Case specific costs associated with alternative decision rules.

There are two, less abstract, reasons why the appropriate decision rule may change. Their implications are shown graphically in Figure 3. The weighted external and transaction are shown here as E_1 and N_1 respectively. Total costs (T_1) indicate a moderate decision rule of D_1 is appropriate.

However, the magnitude of potential external costs varies according to the natural resource decision. In the case of serious, irreversible externalities (like toxic waste contamination) external costs look like E_2. Obviously considering total costs (T_2) the appropriate decision rule is not moderate. Under these circumstances incurring the extra transaction costs associated with the diffuse decision rule (D_2) is justified in order to avoid exorbitant external cost.

Finally, the level of transactions costs may vary according to the specific institutional form. This is the issue to which this paper is addressed. Given external costs are significant but not infinite (E_1), what institutional innovations would lower transactions costs (N_2), thereby shifting the total cost curve (T_3) and allowing participatory decision making to operate at lower cost (R_3). This is the conceptual approach applied to the specific problems in the EIS process discussed here.

Pursuit of improvement in policy must take place in the context of institutional arrangements that may actually be implemented rather than based on some ideal state of "nirvana economics".[30] The question becomes, what modifications in the EIS process can realistically be undertaken, that will give participants the incentive to reach a socially acceptable balance among competing interests at reasonable decision making costs. In the following paragraphs policy innovations are proposed that address the three

problem areas of (1) diverse objectives, (2) uncertainty, and (3) diffuse veto power.

Rectifying the problems that result from diverse objectives can be viewed in the context of internalizing externalities. In the limit all interests would be merged into one firm, thereby integrating diverse objectives into a coherent whole. In realistic terms however, the value systems of interest groups are too divergent for one entity to be capable, or desirous of, representing all factions.

However, there is one case when internalization may be possible. It may be appropriate to combine city and suburban areas into a metro-wide governmental authority. Aligning political and impact boundaries makes ultimate sense for decision making. In merging municipal interests, jurisdictional conflicts based on the desire for power per se would be eliminated and city officials would still be able to represent a coherent set of substantive objectives.

Uncertainty and the need for forecasts cannot be eliminated from the EIS process. But they can be managed in a way that reduces the probability of extreme scenarios and information overload. One possibility is to modify the requirement of "comprehensive" analysis. In the face of uncertainty, the range of potential analyses is limited only by the analysts' imagination of assumptions and combinations thereof. To sanction comprehensive analysis under these circumstance absolutely guarantees information overload.

Assuming external costs are not extremely serious and irreversible, the entire process should focus on "reasonable and moderate" ranges of information. The problem of extreme alternatives can be reduced by giving

analytical and legal weight to moderate rather than extreme forecasts of key variables. Even less weight should be given to scenarios which represent the cumulative effect of several extreme forecasts.

Using the "reasonable range" concept to focus on moderate estimates can effectively limit the information considered in an EIS to that which is useful in content and manageable in size. The result will be to reduce transactions costs and increase the probability of achieving natural resource decisions consonant with the policy intent of NEPA.

Institutional innovations designed to modify decision rules to make decision making more or less diffuse are far reaching and must be considered carefully. In terms of social choice theory, the idea is to devise a constitution for decision making that all parties agree will be fair and acceptable when applied repeatedly, even though in one particular instance it may work to a particular group's disadvantage.[31] That is, the decision rule should not be devised in the context of one particular EIS. Rather it must be a general rule applicable to all potential EIS's.

An institutional arrangement that holds some promise in this regard relies on the concept of a negotiation team. The idea is to develop a small committee made up of representatives of each type of interest group relevant to a particular EIS. The negotiation team would be authorized to perform a variety of functions including (1) make recommendations concerning fruitful avenues for inquiry in an EIS (i.e., suggest the kinds of information that would illuminate rather than obscure avenues for compromise); and (2) negotiate and make formal statements regarding an acceptable compromise among competing interests.

A variation on the negotiation team theme was tried pursuant to the

MDSEIS. The Governors Roundtable was made up of individuals representing diverse interests. This group was able to arrive a set of recommendations that constitute significant steps in achieving creative solutions to complicated problems. Unfortunately the group was not formally empowered and did not have the support of their constituencies.[32]

One may question whether, from an intertemporal perspective, it would be productive to have national representatives of various interests who would negotiate repeatedly over time about various natural resources issues. Would standing, long term development and preservation representatives be better able to indicate the relative priority of many decisions? Would the incentive to compromise emerge, given the negotiations recur on a continuing basis? Studying this possibility in the context of game theory constitutes an important item on a research agenda for the future.

In conclusion, understanding (1) the nature and objectives of interest groups involved in an EIS, (2) the role of uncertainty in game strategic behavior and (3) the costs associated with alternative decision rules, are critical in addressing the problems associated with the EIS process. Systematic analysis in the context of interest group and game theory clarifies the incentives involved and provides the basis for intelligent discourse about potential solutions.

Institutional arrangements are not fixed and constant. Human resourcefulness is. Policies that emerge to regulate natural resource decisions must not be automatically accepted as representing the public's interests or rejected as figments of political vagary. The performance of specific institutions depends on the choice domain open (and closed) to

individuals under certain circumstances, including their opportunities to manipulate the system. By exploring the factors that underlie the performance of institutional arrangements, analysts are better able to determine decision rules that yield an incentive structure consonant with the goal of balancing competing interests in a dynamic context.

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12. See Buchanan, Kreuger and Olson, supra note 1.

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