Modeling the Environmental Collaboration Process: A Deductive Approach*

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Abstract

Collaborative processes in which citizen and industry groups develop mutually-acceptable environmental policies have become increasingly popular over the last two decades. In recognition of the importance of these processes, a substantial academic literature has arisen. The models that have developed within this literature have primarily employed the inductive approach. The purpose of this paper is to argue that the deductive approach can offer a valuable alternative perspective; and to employ that approach to construct a model of collaborative negotiations. Seven hypotheses derived from this model are tested against data drawn from a survey of participants in a land-use planning exercise in the Canadian province of British Columbia.

Keywords: Collaboration, Consensus-building, Environmental decision-making, Resource management

1. Introduction

Collaborative processes, in which citizen, government, and industry groups develop mutually-acceptable environmental policies, have become increasingly popular over the last two decades. In recognition of the importance of these processes, a substantial academic literature has arisen.[1] The models that have developed within this literature have primarily employed the inductive approach; that is, they represent abstractions from large sets of observations collected by researchers and by participants in collaborative processes. The deductive approach - in which theories are constructed from fundamental axioms, <u>before</u> data are collected - has received little attention, despite its proven value. The purpose of this paper is to apply that approach to the modeling of collaborative negotiations, not to replace the current inductive models, but to provide an alternative perspective on the same topic.

The paper is organized into three sections. Section 2 develops a deductive model that can, it is argued, provide a useful framework within which collaborative processes may be analyzed. The third section employs that model to derive seven specific hypotheses about the functioning of those processes. Finally, Section 4 contrasts those hypotheses with data drawn from a survey of participants in an environmental planning process that was undertaken in British Columbia, Canada.

2. Theoretical framework

Modern writers on scientific methodology, such as Popper (1959, 1985), Friedman (1953), and Kuhn (1970), argue that the hallmark of a useful theory is not its conformance with "reality" but its ability to generate testable hypotheses. In keeping with this view, this section introduces a model of collaboration whose primary recommendation is that it is able to generate a large number of testable hypotheses from a very simple framework. This simplicity derives from the "unrealistic" assumptions that there are only two parties, negotiating over only two issues. No allowance is made, for example, for there to be multiple parties or multiple issues, or for there to be dissension

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[1] For useful surveys of the literature see Pritzker and Dalton (1995); Chess and Purcell (1999); and Andrew (2001).

within the groups that are represented at the bargaining table. Furthermore, it will also be assumed that the parties' preference, or utility, functions are established before they come to the table: bargaining does not change either party's perceptions of its own preferences. Although each of these assumptions may conflict with our observation of "real world" environmental negotiations, it is argued that the resulting model is valuable in the sense that it is able to generate testable hypotheses.

2.1 The Basic Model

The classic problem to which the collaborative approach is applied is that in which the government wishes to allocate public lands (or waters) among a number of alternative uses. For example, these lands might be divided between commercial uses – such as agriculture, logging, or mining – and "public" uses – such as recreation and wildlife preservation. Within those allocations, various constraints may be placed on permissible uses. With respect to commercial lands, for example, ranchers might be required to prevent their cattle from disturbing riparian ecosystems or logging companies might not be allowed to use clear-cutting techniques. On public lands, limits might be set on the number of hotels that can be built or on the number of miles of roads that can be constructed. To simplify the analysis, assume that these alternatives can be captured in two characteristics: (i) the number of acres of public land to be set aside as environmental reserve, A, and (ii) the level of (environmental) restrictions to be placed on the commercial and recreational use of each acre of land in that reserve, R. In Figure 1, A is assumed to increase from 0 to 100 percent of all available land along the horizontal axis; and, along the vertical axis, R is assumed to increase from no restrictions to a complete ban on all human use.

Assume, further, that two groups - environmentalists and developers - have preferences concerning the determination of A and R. Although environmentalists generally prefer higher values of both A and R, their utility is maximised at a value of A at which less than 100 percent of the land has been placed in reserve and a value of R at which human activity has not been completely restricted. In Figure 1, for example, their utility might be maximised at a point like E* - their "bliss point." Similarly, although developers generally prefer low values of both A and R, their utility is maximised at a

point like D* in Figure 1. Each party's utility is assumed to fall as the distance between its bliss point and any alternative outcome increases. Thus, curves drawn through points of equal utility – indifference curves - form contours around points E* and D*. For example, although environmentalists prefer E* to any point on curve E_1 in Figure 1, and prefer any point on E_1 to any point on E_2, they are indifferent among points J, K, and L, all of which lie on E_2. Similarly, developers prefer D* to D_1, D_1 to D_2, etc. Diagrams like Figure 1 are known, in honor of their originator, F. Y. Edgeworth, as <u>Edgeworth boxes</u>.[2]

As environmentalists and developers both obtain utility from each combination of A and R in Figure 1, the indifference curves of both parties pass through each point in that diagram. For example, point X lies on both D_4 and E_3. At X, and at all other points in the region between D* and E*, environmentalists and developers are in conflict, in the sense that the former prefer more of both A and R, while the latter prefer less of both. Although a move from X to X_e, for example, makes environmentalists better off, it makes developers worse off. Nevertheless, there are reallocations of A and R that would make both parties better off. Specifically, because the environmentalists' indifference curves are convex ("bowed in") to the origin and the developers' indifference curves are concave ("bowed out"), if a point like X is defined in Figure 2, both parties will prefer every point in the area between the two indifference curves that pass through X – D_1 and E_1 in Figure 2 – to point X.

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[2] I am aware of only one other paper that has employed the Edgeworth box approach to model environmental policymaking: Spence and Gopalakrishnan (2001). However, Figure 1.7 in Susskind, et. al. (2000) employs a similar approach.

Figure 1

Edgeworth Box

A, Percentage of Land Protected
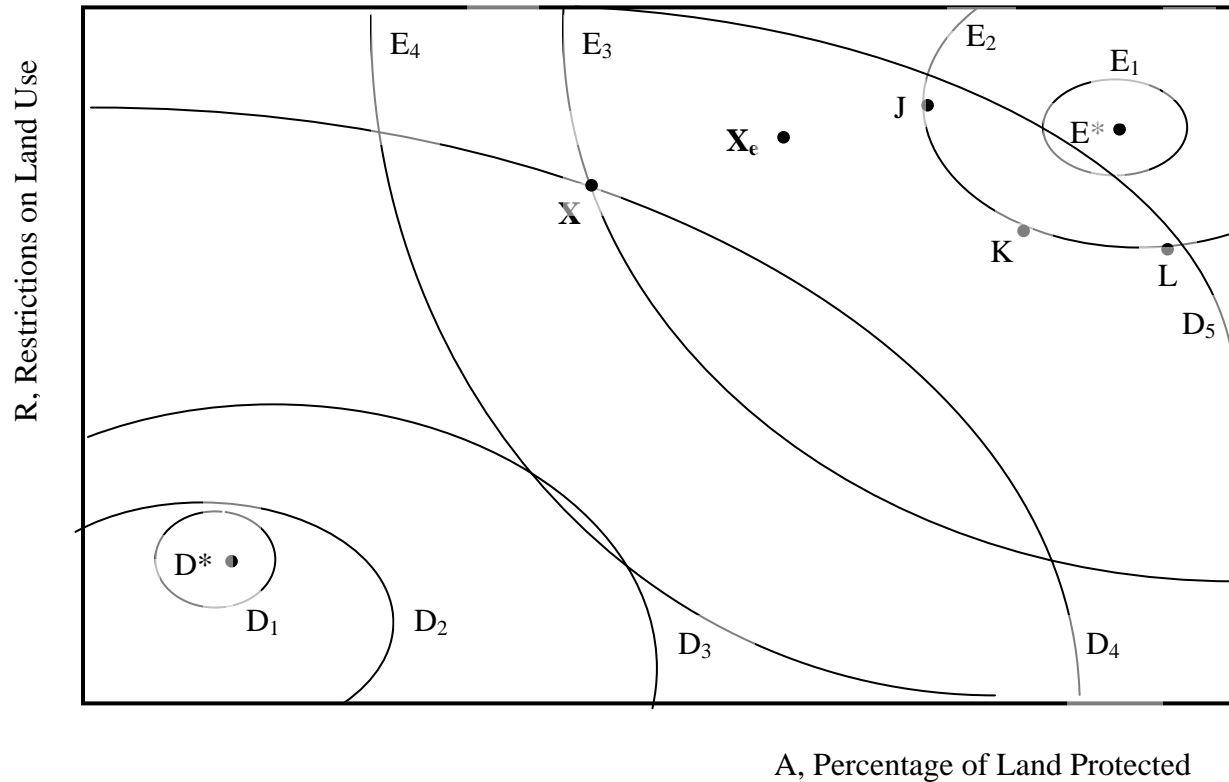
Assume now that the government has announced that it will enforce any agreement that is reached between developers and environmentalists; and that the parties believe that outcome X will be imposed if they fail to reach agreement. It can be expected that the parties will restrict their negotiations to the set of points in the area between D_1 and E_1, because at least one party will prefer X to any point outside that area. For this reason, the area between D_1 and E_1 may be referred to as the <u>bargaining lens</u> (defined by X). For example, X_1 would be preferred to X by both parties because it is at the intersection of E_2 (which environmentalists prefer to E_1) and D_2 (which developers prefer to D_1). And because D_2 and E_2 intersect at X_1, both parties would prefer every point between those two curves to X_1; thereby creating a new bargaining lens (defined by X_1) within which there exists the possibility for additional trade offs between the two parties. Only when the allocation under consideration lies at a point of tangency between the two

parties' indifference curves, (such as at X_2), would the possibilities for mutually-advantageous exchange be exhausted.

Figure 2
Bargaining Lens
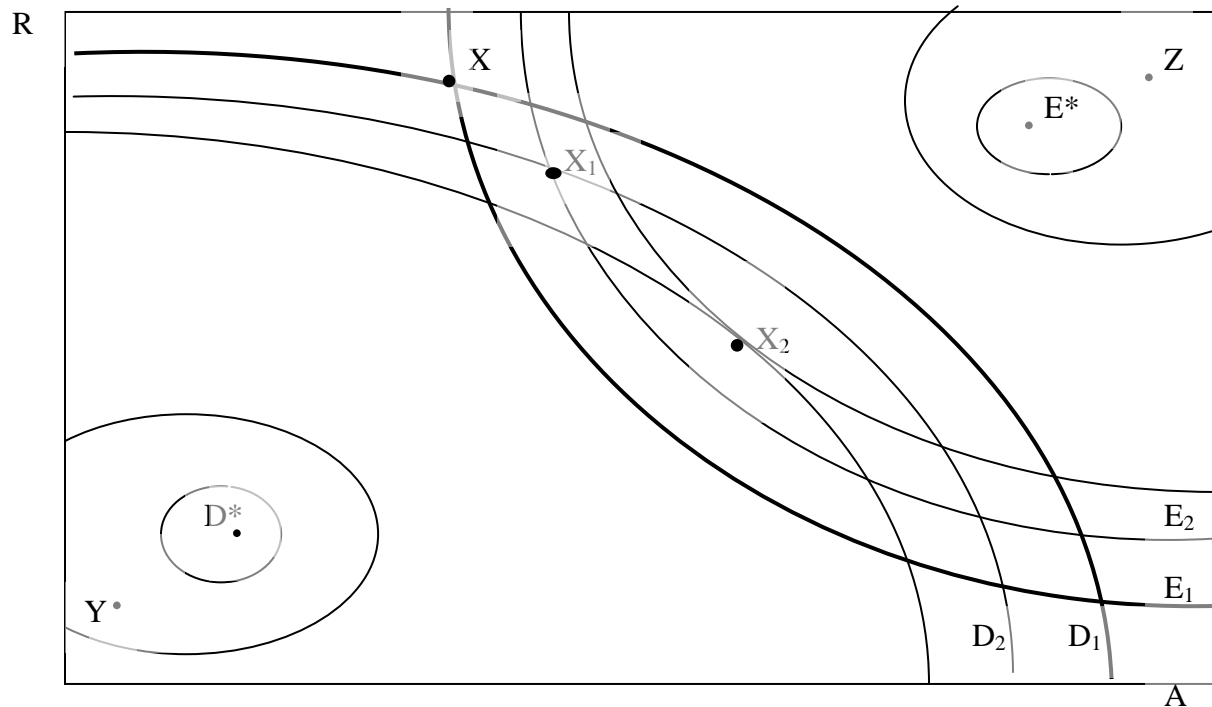
Finally, it can be seen that if the initial allocation of resources exceeds the bliss point of either party, it will be possible to make both parties better off without either of them having to make a trade-off. If the initial allocation is below and to the left of D*, at Y in Figure 2 for example, increasing both R and A will make both parties better off; and, conversely, if the initial allocation is above and to the right of E*, at Z for example, decreasing both R and A will make both parties better off.

3. Hypotheses

The Edgeworth box model can be used to construct a number of hypotheses concerning the functioning of collaborative processes. In many cases, these hypotheses are consistent with those that have been developed elsewhere in the literature, but in other

cases the model is able to provide a level of depth and complexity that has previously been absent from the literature.

3.1 Common interests

Assume that the government has placed two constraints on the use of the land in a particular region: It has set aside A_1 acres as environmental reserve and, within that reserve, it has imposed a degree of restraint on human use, R_1. Assume further that the government has invited two interest groups – environmentalists and developers – to collaborate on the establishment of new values of both A and R; and that those groups have agreed upon some allocation (A_2, R_2). The literature on environmental collaboration suggests that, in the absence of duress, there are two circumstances in which the parties might have reached this accommodation. First, both parties may have preferred A_2 to A_1 and R_2 to R_1; that is, the parties may have shared common preferences, or common interests. Second, the parties may have had different preference rankings, but each may have been willing to trade off reduced utility from one characteristic for increased utility from the other. For example, environmentalists may have considered the gain in utility associated with the move from A_1 to A_2 to exceed the loss in utility associated with the move from R_1 to R_2 (and conversely for the developers). Exchanges based on common interests will be analyzed in this section; those based on trade offs will be analyzed in the following section.

Although the early literature appears to have suggested that interest groups might share common interests, this view has fallen out of favor, with many commentators derisively referring to it as the "hot tub" theory of environmental negotiations – if we all just get into a hot tub and talk over the issues in a calm and reasoned manner, we will find that most of our differences are simply the result of misunderstandings. (See especially Harter (1982) and Amy (1987).) The Edgeworth box model gives some support to this criticism.

First, if the parties' preferences differ significantly, as they do in Figure 1, they will appear to share common interests only if the initial allocation of resources lies to the right of the environmentalists' bliss point (E* in Figure 1) or to the left of the developers' bliss point (D*). In the former circumstance, the parties can be expected to agree to

reduce <u>both</u> the number of acres of environmental reserve and the level of restrictions on that land; and in the latter they can be expected to agree to increase both of these allocations. But, as the divergence between the parties' preferences increases, the probability that the initial allocation of resources will lie <u>between</u> the parties' bliss points decreases; and the probability that negotiations will be based on "common interests" will decrease accordingly.

> ***Hypothesis 1***: If the parties hold widely divergent views, it is unlikely that they will appear to share common interests. That is, it is unlikely that they will agree concerning the direction of changes to the initial allocation.

3.2 Trade-offs

Reference to Figure 3 helps to clarify the circumstances under which parties who do <u>not</u> share common interests will be able to collaborate on the development of a mutually-acceptable policy. Consider, first, point X in that figure. At that point, environmentalists prefer increases in both A and R, while developers prefer <u>decreases</u> in both values. It might appear, therefore, that any change to the values of either, or both, A and R would represent a gain to one party at the expense of the other. Nevertheless, it is seen in Figure 3 that point X_1 – which has a higher value of R and lower value of A than does X - is preferred to X by both parties. This gain in utility arises because the parties attach different <u>relative</u> values to increments in R and A. For example, assume that environmentalists receive 70 units of utility for each unit of A and 30 units for each unit of R (for a relative value of 70/30); whereas developers lose 25 units of utility for each (additional) unit of A and 40 for each unit of R (25/40). If the parties agree to "trade off" a one unit increase in A for a one unit decrease in R, environmentalists will make a net gain of 40 units of utility (70-30) and developers a net gain of 15 (40-25). In short, the minimum requirement for negotiations to take place between parties with inconsistent preference orderings is that they have different relative preferences for the characteristics under consideration (here, A and R).

Figure 3
Trade Offs
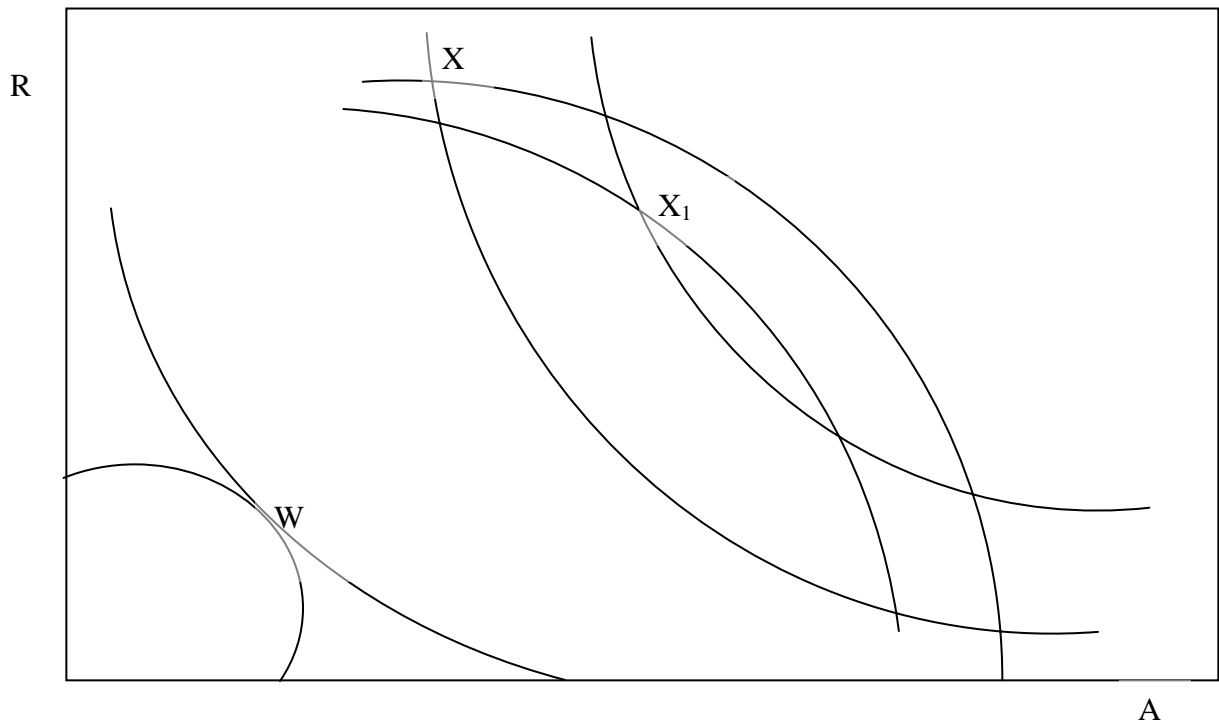
A corollary is that negotiation will not take place if there is only one issue under discussion (see Harter (1982), Susskind and McMahon (1985), and Perritt (1995)). Assume, for example, that the parties were restricted to negotiating over only the size of the environmental reserve, A, and the government had announced that if the parties failed to reach agreement it would select outcome A_g. Any party that wished to induce the other to move away from A_g would have nothing to offer in exchange. No trades could be made. The parties could only be expected to agree on an outcome different from A_g if they shared common interests.

Furthermore, the parties' ability to negotiate a new agreement does not depend on how "undesirable" the initial position is to one of the parties; rather, it depends on the gains that the parties can expect to make *relative to* the initial position. For example, even though a position like W, in Figure 3, is considered to be highly undesirable by environmentalists, there are no moves away from that position that will make both them and the developers better off. It is only when the parties' indifference curves *intersect* at the initial position, such as at X, that mutually-beneficial exchanges can be made. No

such exchanges can occur if the parties' indifference curves are *tangent* at that point (as they are at W).

Finally, even if mutually-beneficial exchanges are available, those exchanges may not take place if the costs of negotiation are high relative to the potential gains. In Figure 3, for example, there are very few opportunities for mutual gain when the initial allocation is given by X_1. Hence, if the negotiation process is expensive or time-consuming, the parties' optimal policy may be to accept X_1 without negotiation. A corollary of this observation is that a failure on the part of interest groups to enter negotiation, or to reach a consensus, does not necessarily signal that the environmental collaboration process has failed. Rather, it may simply be that there were very few mutually-beneficial changes that could have been made to the initial position that was presented to them.

> *Hypothesis 2*: Most negotiations between parties will take the form of "trades." Furthermore, the probability that such trades will take place will not be affected by the degree to which the initial allocation of resources is considered to be undesirable; but will be influenced by the cost of the negotiation process.

3.3 Best alternative to a negotiated agreement (BATNA)

It has become commonly accepted in the literature that the course of negotiations will be strongly influenced by the parties' expectations concerning the policy that will be implemented if they fail to reach agreement – what Fisher and Ury (1991) called "the best alternative to a negotiated agreement," or BATNA. They will negotiate quite differently, for example, if they anticipate that the BATNA will be favorable to environmentalists than if they anticipate that it will be favorable to developers. What is not clear in the literature, however, is precisely how the BATNA affects the negotiation process. The model developed in Section 2 casts some light on those issues.

3.3.1 Expectations concerning BATNA are shared by all parties

Consider first the situation in which the parties know for certain what the public policy will be if they fail to reach an agreement. One such situation might occur when the interested parties are local groups that are negotiating over the application of national legislation to their region. If the legislation identifies what the regional policy is to be, in

the absence of a negotiated agreement, and if the parties are not sufficiently well organized to have an impact on national legislation, the local groups will have to take the BATNA as given.[3] Another such situation occurs when a government agency announces that it will introduce a particular regulation <u>if</u> the affected parties cannot agree to an alternative regulation (Pritzker and Dalton, 1995). As long as the parties lack the political power to have the proposed regulation overturned, they will treat that regulation as the best alternative to a negotiated outcome.

The situation in which the BATNA is clearly known to all parties is the one that is, implicitly, described in Figure 4, below. A number of conclusions can be drawn from that figure. First, the statement of the BATNA effectively precludes the parties from reaching agreement to any policy set that lies outside of the "bargaining lens." If X is the default option (the BATNA) in Figure 4, the parties will not voluntarily agree to outcomes such as X_e, as the developers are better off at X than at X_e. Conversely, once it has been announced that X is the BATNA, the parties have a strong incentive to agree to an outcome that lies within the bargaining lens – the area between D_1 and E_1 in Figure 4. (See especially Perritt, 1987.) All such outcomes require that <u>both</u> parties make concessions on their initial positions, at X.

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[3] The local application of the Endangered Species Act is a potential example of this phenomenon. In that case, local groups often negotiate habitat conservation plans that differ from the policies that would have been implemented by government officials.

Figure 4
The BATNA
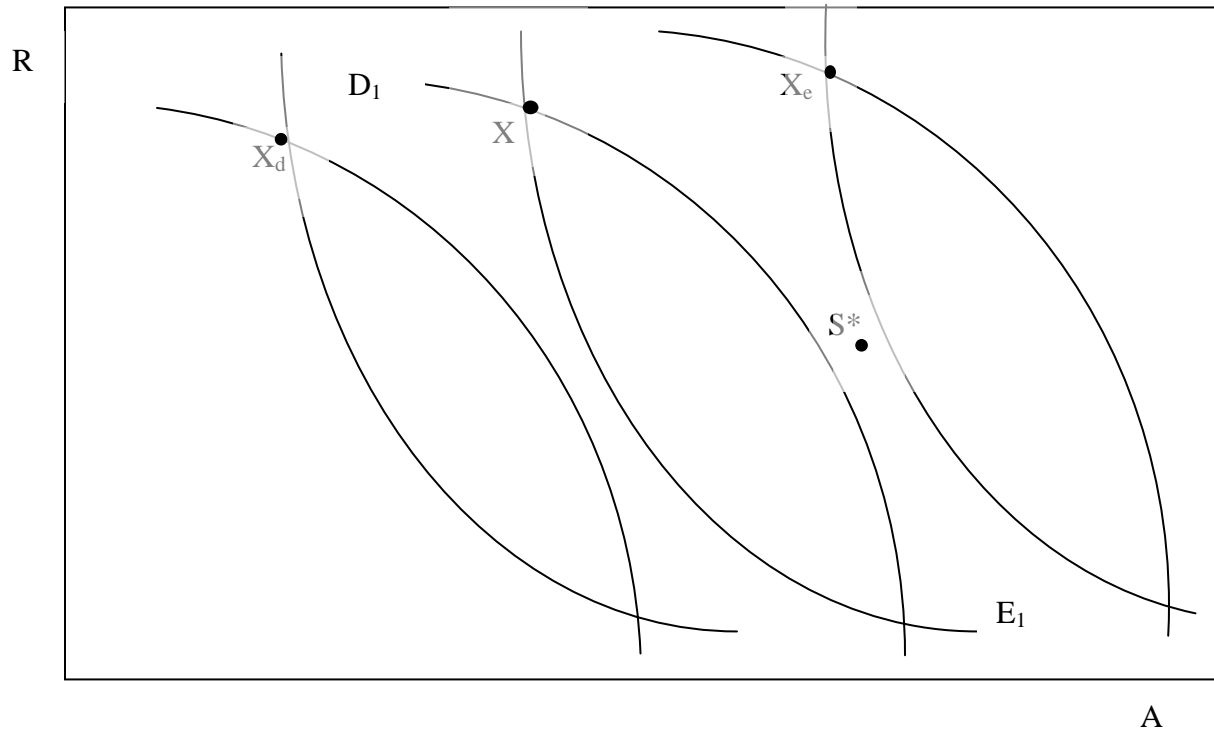
Although negotiation is expected to make both parties better off <u>relative to</u> the BATNA, it cannot be assumed that the socially optimal outcome will be achieved, however that may be defined. Assume, for example, that the optimal outcome is given by S* in Figure 4 and that the BATNA is X. As S* lies outside of the bargaining lens defined by X, the parties cannot be expected to agree to S* voluntarily. If one of the parties is worse off at the social optimum than it would be at one of the points inside the bargaining lens, it has no incentive to agree to the optimum.

> *Hypothesis 3*: If the policy that the government will select in the absence of collaboration is known to the parties, the outcome they adopt will be strongly influenced by that policy even if the parties reach consensus through open and unfettered bargaining.

3.3.2 Parties share expectations concerning uncertain outcomes:

In many, if not most, cases the parties are not certain what the outcome will be if they fail to reach a negotiated agreement. It might be, for example, that the government has not yet announced the policy it will introduce if the parties do not reach a consensus. Alternatively, if one or both of the parties is dissatisfied with the collaboration process, it may prefer to take its case to the courts or to lobby the government. In each of these cases, the value of the BATNA will be uncertain. Nevertheless, if the parties share the same expectations concerning the probabilities that various outcomes will arise, a bargaining lens will still be created. For example, if the parties both believe that there is a 40 percent chance that the courts would choose some outcome P and a 60 percent chance that they would choose outcome Q, they might each act as if the BATNA was the expected value of the court decision, E, $(= 0.4P + 0.6Q)$. If they are risk neutral, a bargaining lens will form around E, just as it was predicted to form around X in Figure 4, and negotiations would be expected to take place within that lens.

Furthermore, if the parties are risk averse, they may be willing to accept outcomes that are outside the bargaining lens defined by the expected value, E, rather than take the risk that the courts or legislature will select an outcome that is unfavorable to them. Thus, uncertainty about the BATNA will both add to the incentive for parties to enter the collaborative process and create a larger set of acceptable outcomes from which to choose.

> ***Hypothesis 4***: If the parties are uncertain about the policy that will be imposed if they fail to reach agreement (and are risk averse), but share similar perceptions concerning the probabilities that various policies will arise, they will have a greater incentive to reach agreement than if they were certain about the default outcome.

3.3.3 Parties do not share expectations concerning uncertain outcomes

If the outcome of lobbying or litigation is uncertain and the parties do not share the same expectations concerning that outcome, it may not be possible to induce the parties to collaborate. For example, if developers expect to be able to induce the courts or legislature to impose outcome X_d in Figure 4, whereas environmentalists expect to be able to obtain outcome X_e, the bargaining lenses created by those outcomes will not

intersect. That is, there will be no outcome that the developers will consider to be preferable to X_d that the environmentalists will also consider to be preferable to X_e and any attempt at negotiation will be expected to fail.[4]

> **Hypothesis 5**: If the parties have inconsistent expectations concerning the policy that will be imposed if they fail to reach agreement, there is a strong presumption that collaboration will fail.[5]

3.4 Framing

In many cases, the participants in collaborative processes are drawn from local businesses, recreation groups, and environmental organizations. These groups often find the number and complexity of the issues facing them to be overwhelming. Governments may be able to reduce this complexity somewhat – making the negotiation process more tractable – by "framing" the issues; that is, by asking the committees to resolve only a selected number of problems set within a larger framework. In Figure 5, for example, the government might specify that the parties must select a value of A that is equal to or less than A*. As this restriction excludes many of the outcomes that would have been attractive to the two sides, it increases the probability that the parties will choose an outcome along the vertical line between X_1 and X_3. In that case, negotiations will primarily concern the choice of the value of R.

As trade offs will not have to be made between A and R, the parties may find it easier to select an outcome than if they were free to vary both characteristics. At the same time, however, the probability that both parties will prefer some outcome to the one they have "chosen" will increase.[6] For example, even though the parties might be induced to select X_2 in Figure 5, it is seen that both of them consider that outcome to be inferior to all of the possibilities contained in the bargaining lens. In this case, the parties can be expected to lobby the government to overturn the outcome that they have "selected."

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[4] An exception would occur if the parties were so risk averse that they would prefer to accept an "inferior" outcome rather than take the chance that the courts or legislature would impose an unfavorable outcome.

[5] Ashenfelter and Johnson (1969) argue that even if the <u>negotiators</u> share similar expectations, the members of the groups that they represent may have inconsistent expectations, thereby leading to a break down in negotiations.

[6] Holzinger (2000, at p. 300) describes a situation in which the passage of a new environmental regulation meant that "… the optimal solution for the opponents … vanished from the spectrum of alternatives."

Figure 5
Framing
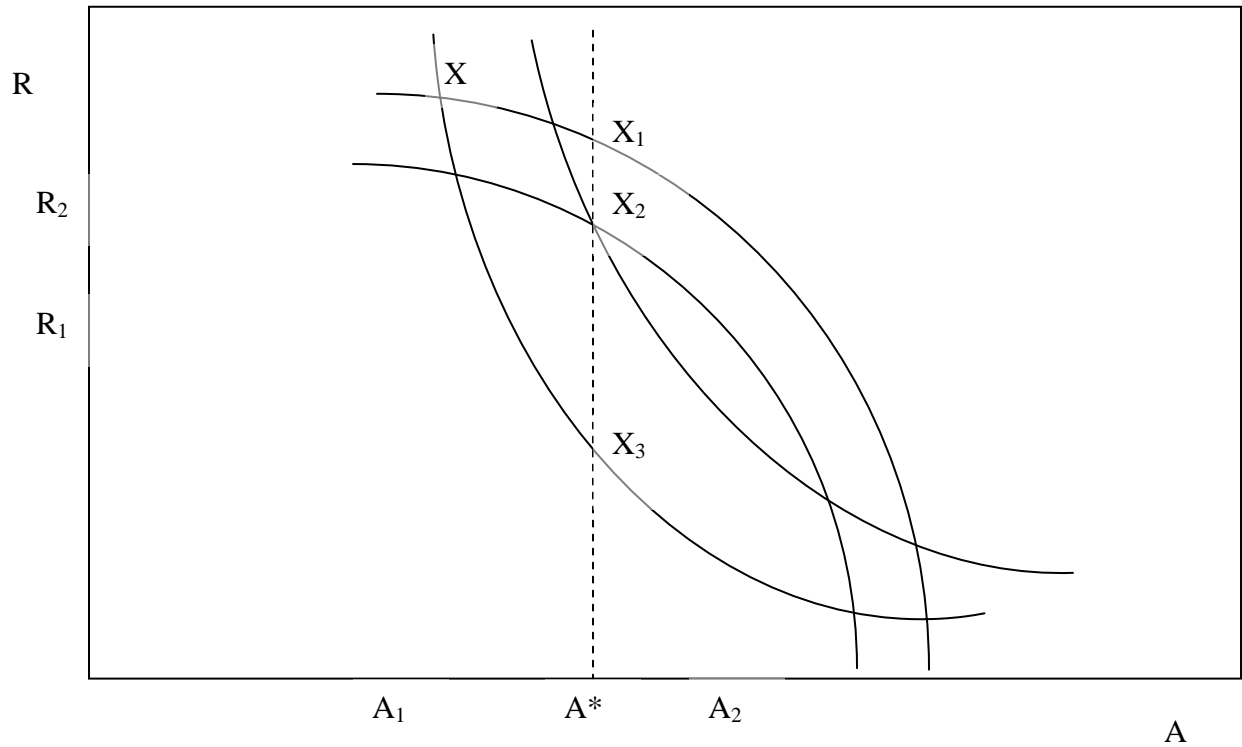
Hypothesis 6: If the government "frames" the issues to be negotiated (by restricting the set of possible outcomes), it may increase the probability that the parties will reach consensus. However, it will, at the same time, increase the probability that both parties will be dissatisfied with the outcome they have "chosen."

3.5 Bargaining power

In the literature it is commonly argued that equality of bargaining power between the parties is a prerequisite to environmental collaboration. When the Edgeworth box model is used to analyze this assertion, however, it is seen to have only limited application.

Assume that developers have sufficient political power that they have been able to induce the government to select a default policy that is very favorable to them, for

example, outcome V in Figure 6. Most commentators imply that this application of unequal power will prevent collaboration from being successful. (See Harter (1982), Holzinger (2000), Amy (1987), and Wondolleck and Yaffee (2000)). Yet, because V lies at the intersection of two indifference curves – D_v for the developers and E_v for the environmentalists – a bargaining lens has been created within which both parties can be made better off, relative to V. If consensus is required before an outcome within that lens can be adopted, each party can threaten to block the other's gains by refusing to agree to any proposal that is made. In this sense, each party has the same "bargaining power" as the other. Developers are just as likely to accede to environmentalists' demands, in order to obtain an improvement relative to V, as environmentalists are to accede to developers' demands as both have something to gain from collaboration. In short, although political and economic power may determine the BATNA, if the BATNA can be identified clearly, the parties should be able to negotiate with one another to reach a mutually acceptable outcome.

Figure 6
Bargaining Power
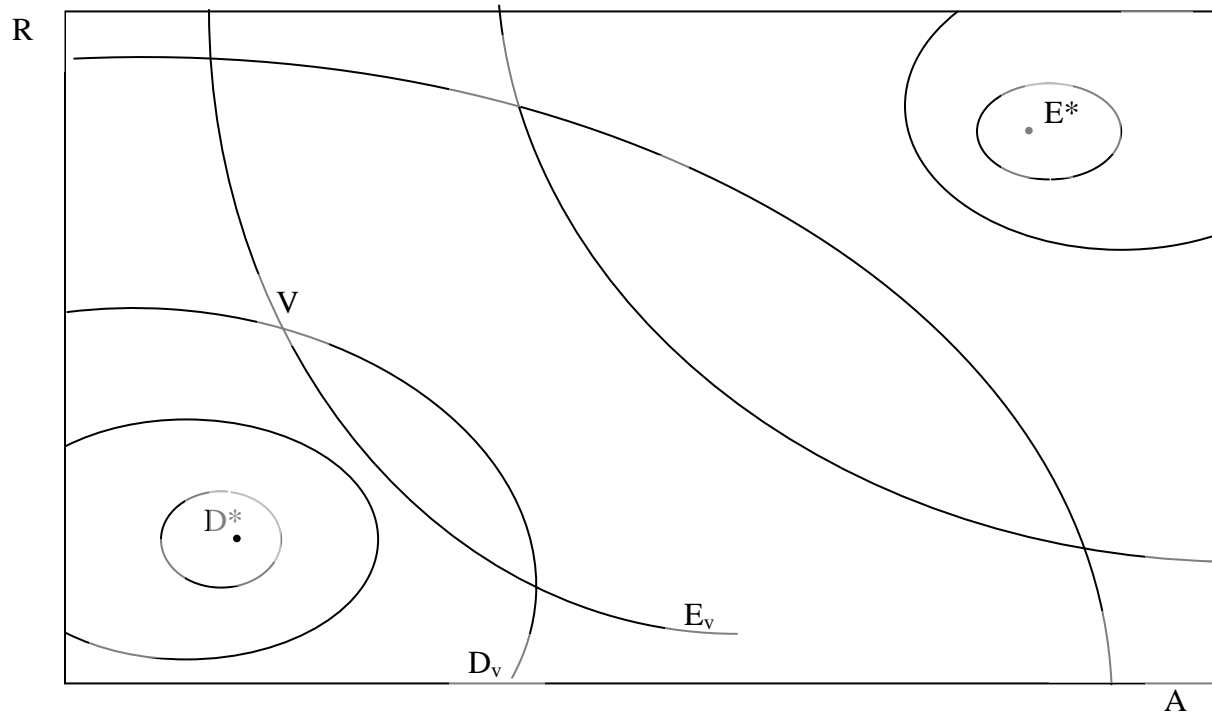
Where inequality of bargaining power does affect the operation of a system of environmental collaboration is through its influence on the positioning of the BATNA. But this is not a failing of <u>collaboration</u>. In <u>every</u> system of environmental policymaking, the parties with the greatest economic and political power will have the greatest influence on government policy. Indeed, collaboration is not a substitute technique for making policy; it is an "add-on." That is, the collaborative process takes the outcome that has resulted from the machinations of the political, administrative, and legal systems – the BATNA – and attempts to improve on that outcome. Thus, the question is not whether policy should be set using collaboration <u>or</u> using some other process; the question is whether collaboration should be used <u>in addition</u> to those other processes. It is not a criticism of <u>collaboration</u> to say that the BATNA is strongly influenced by political and economic power. <u>All</u> policy is influenced by those factors. The relevant question with respect to collaboration is whether it leads to an improvement in the policies that would otherwise be put into place.

> *Hypothesis 7*: The parties' willingness to enter collaborative processes, and their ability to reach mutually-beneficial outcomes, will not be affected by the parties' relative economic or political powers (as long as consensus is the decision rule).

3.6 Extensions of the Model

The purpose of this section has been to use deductive reasoning to develop a model of environmental decision-making that meets the criteria established by writers such as Karl Popper and Milton Friedman: falsifiability, simplicity, and clarity. It was shown that, not only is it is possible to construct a model that meets these criteria, but that such a model is capable of generating a rich set of refutable hypotheses.

Nevertheless, as is true in the development of any model that abstracts from reality, it was necessary to exclude some behaviors from consideration. This leaves open a number of important directions in which the model might be extended in the future.

From the point of view of the modeling process, for example, one of the most important assumptions was that the parties anticipated that any agreement they reached

would be implemented (perhaps by the government). In terms of game theory, this meant that the analysis could be restricted to that subset of negotiation processes known as cooperative games. It will be argued in Section 4 that this type of analysis is appropriate to the particular process that was undertaken in British Columbia (and many other jurisdictions). There is, however, an important subset of collaborative processes in which the participants cannot be confident about the enforceability of their agreements – for example, when the parties negotiate without government sanction. In these cases, it may be appropriate to model the process as a non-cooperative, non-zero sum game; or, alternatively, to model it as co-operative game in which the government was a third player (and could credibly commit itself to implementation of any mutual agreement).

Second, although the underlying model in this paper is that of a cooperative game, no attempt was made to predict the outcome of the negotiation process. Rather, it was sufficient for the development of the testable hypotheses presented here that it be assumed that the parties will be able to reach an agreement within the bargaining lens, (if they have consistent estimates of the BATNA). Future extensions to the model might use bargaining theories – such as those proposed by Nash (1950) or Harsanyi (1977) – to obtain more detailed predictions concerning the negotiated outcome.

Third, it has been assumed in this paper that the determination of the BATNA was exogenous to the negotiation process. This assumption may be appropriate if the parties perceive that they have very little influence over the body that sets the BATNA, (usually the government or the courts), or if the parties have exhausted all of their attempts to influence the BATNA. However, if the determination of the BATNA is considered to be endogenous to the negotiation process, a more elaborate model, involving at least three actors – the government and two special interest groups - would be necessary.

Finally, although it will be argued in Section 4 that the other simplifying assumptions that have been made in this paper do not invalidate the model presented here, it may be instructive to investigate the effect of relaxing them. These assumptions include: that there are only two interested parties, that only two issues are under negotiation, and that there is no dissent within the interest groups.

4. Empirical evidence

The purpose of this section is to provide some preliminary tests of the hypotheses developed in Section 3. The data that are used have been taken from a survey of participants in an ambitious land use planning process that was conducted in British Columbia, Canada. Before the data are analyzed, brief descriptions of this process, and of the survey of participants, are provided.

4.1 British Columbia's Land and Resource Management Plans

Following the recommendation of the Brundtland Report, in 1992 the Government of Canada and its ten provincial governments signed a document entitled the Tri-Council Statement of Commitment under which each province committed itself to set aside at least twelve percent of its land base as protected areas. The province of British Columbia responded to this commitment by dividing the province into twenty-four districts, within each of which goals were established for the percentage of the area that should be protected. In four of these districts, the planning decisions were made under a process known as the Commission on Resources and Environment, or CORE. In the remaining eighteen, the processes were referred to as Land and Resource Management Plans, LRMP. As the government made it explicit that the LRMP processes were to follow a consensus-building approach, it is the deliberations in those processes that were investigated for the purposes of this paper.

The LRMP process represented an unusually ambitious form of collaboration for three reasons. First, each district covered an immense amount of land. The Prince George district, for example, encompassed more than 13,000 square miles – an area larger than Massachusetts (British Columbia, 1997). Second, in most LRMP's, no limit was set on the number of individuals who could sit on the planning committee. Most committees had a core membership of twenty to thirty individuals, with many more than that attending individual meetings. Third, and most significantly, the committees' mandate was not restricted to the identification of a set of protected areas within the larger landscape – their mandate was to develop a detailed zoning system for the entire district. In most cases, this meant dividing the district into forty to sixty zones, each of which was allocated to one of six broad use-types: settlement and agriculture, general resource

management, special resource management, natural habitat, enhanced resource management, and protection. Furthermore, with respect to each zone, detailed objectives were established concerning matters such as protection of wildlife and watersheds, exploitation of timber and minerals, and provision of recreational opportunities. (As a result, the completed plans were often over two hundred pages in length.)

An important aspect of the LRMP process was that the government took care to assure participants that their deliberations would form the basis of government policy. This assurance took two forms. First, the government signaled its commitment by investing very heavily in the process. Numerous detailed background documents were prepared; participants were offered seminars on negotiation; and a substantial portion of the field budgets of the relevant agencies was devoted to the LRMP. Second, as each committee made its recommendation, the government implemented that recommendation with very few changes, thereby sending a signal to the remaining committees that the government was serious about its promises.

The LRMP process began in some districts as early as 1993. However, for logistical and political reasons, only nine had been completed by the beginning of 2000, and only twelve had been completed by the beginning of 2004. For the purposes of this study, every participant in the nine plans completed by 2000 was contacted by mail, following procedures recommended in Dillman (2000)[7], and asked to complete a detailed survey. Of the approximately 235 participants contacted, sixty-nine, or approximately thirty percent, responded[8]. (Although this number is low, it falls within the 30 – 60 percent range that has been obtained in other mail surveys (Jakobsson and Dragun, 2001).) It is these responses that have been used to test the hypotheses from Section 3.

4.2 Hypothesis Testing

In this section, the seven hypotheses developed in Section 3 are restated and the evidence from the LRMP survey concerning each of them is presented.

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[7] Each participant was contacted twice, questionnaires were accompanied by personalized cover letters describing the intent and importance of the survey, and participants were offered financial rewards for participating.

[8] As it was difficult to obtain current mailing lists and as many of the individuals listed as participants had limited, or no, involvement in the development of the final plans, 235 is an upper estimate of the numbers of actively involved individuals who actually received questionnaires. Hence, the thirty percent response rate is a lower bound on the true response rate.

Hypothesis 1: If the parties have widely divergent views, it is unlikely that the parties will appear to share common interests. That is, it is unlikely that they will agree concerning the direction of changes to the initial allocation.

With respect to the question of whether the parties had divergent views, it was found that even though many of the respondents felt that the process had given them a better understanding of the views of other interest groups, by the end of the process most participants still perceived the various parties to be in an adversarial position. Typical comments included one from a logger who complained that the "environmental side would not bend to any kind of industry (proposal);" and one from an environmentalist whose view was that "conflicts are between those that have a develop-everywhere attitude and those that believe in restricting development for conservation and preservation." Many other similar comments made it clear that the various groups (and individuals) represented at the table did not share common preference functions.[9]

Accordingly, collaboration would only appear to result from a confluence of opinions among the various parties when the initial position allocated so many resources to those who held the most extreme views that even those individuals would prefer to restrict that allocation. For example, if there were no restrictions on logging, those who were generally in favor of "logging everything" might prefer to protect at least a small area for a wildlife corridor; and even those who opposed "development of any kind" in protected areas might be sufficiently concerned about unemployment that they would recommend that directional drilling (for petroleum) be permitted from adjacent lands.

The survey results were consistent with this expectation. Specifically, when asked whether there had been issues that had been resolved "…fairly easily once the various parties understood one another's positions more clearly…" the majority (sixty-seven percent) of respondents answered that no issues had met this criterion. Furthermore, the issues that the minority identified as having been resolved "easily" were all ones on

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[9] Although participants were not asked directly about their perceptions of the degree of commonality of interests, they were asked whether the process had "reduced the amount of conflict over land use." Only sixty percent agreed that it had, and many of their answers indicated that they felt that a substantial degree of conflict remained. The other forty percent did not believe that there had even been a reduction in conflict.

which no clear government policy had previously been developed. This meant (in those cases) that there were changes that all parties could agree should be made. For example, it appears that prior to the establishment of the LRMP process, the government had not established clear criteria for the protection of caribou habitat. Many respondents reported that even logging companies could agree that this protection called for at least <u>some</u> restrictions on forest land, and those agreements were often reached easily. Other policies that were agreed to "easily" included an agreement that mushroom pickers would be allowed to enter a forest during mushroom season; and that ranchers would be allowed to graze their cattle in certain protected areas in which such grazing was not expected to harm the natural habitat.

In most cases, however, the LRMP process was simply one in a line of government initiatives to plan resource use within the province. Hence, the allocation of land that was in place at the beginning of the LRMP was the outcome of a series of compromises that had been made over time between the responsible government agencies and various interest groups. It would be unlikely that these groups would have left any mutually-beneficial changes unmade. The responses to the survey suggest that that was the case.

In short, the responses to the LRMP survey suggested that commentators are generally justified in their criticism of the "hot tub" theory of negotiations. Nevertheless, as the model developed in this paper predicted, the parties may be able to find common ground on issues that have not previously been the subject of concerted government action.

> ***Hypothesis 2***: Most negotiations between parties will take the form of "trades." Furthermore, the probability that such trades will take place will not be affected by the degree to which the initial allocation of resources is considered to be undesirable; but will be influenced by the cost of the negotiation process.

Once again, this hypothesis is composed of three sub-hypotheses. The first of these was amply confirmed by the participants in the LRMP survey. Not only did eighty percent respond affirmatively to the question "Did you resolve any issues by 'trading off' one of your goals 'in return' for a concession from one of the other groups?" most were

able to provide detailed examples of such trade offs. Typical examples included: "harvesting was permitted in some areas in exchange for none in other areas;" "[increases in] protected areas were 'trades' for the relaxation of visual quality standards;" "expansion of a proposed provincial park boundary [was traded] for logging a new watershed in a sensitive manner;" and "larger harvesting openings [were allowed] but … small animal habitat [was created] by building and leaving debris piles."

The second component of Hypothesis 2 – that parties would find it in their interests to negotiate even if the initial allocation was unfavorable to them – was confirmed in two senses. First, it was clear that many environmental representatives felt that the percentage of the land base that was set aside for preserved areas was much too low. For example, comments from environmentalists included: "the percentage target for protected areas was imposed on us in a very heavy handed manner;" "the government policy of 5% protected area ….was the greatest impediment [to negotiation];" "we resented the restriction to 4% protected area for our region;" and "one policy that frustrated some members was the government limitation on the amount of protected area." Yet the environmental groups remained at the bargaining table. Second, even though the dozens of different groups that took part in the nine LRMPs had widely differing views about the desirability of the initial positions, all but one of those groups agreed to continue bargaining until a consensus was reached.

The third component of Hypothesis 2 – that participants might leave some issues unresolved if the costs of negotiation exceed the expected benefits – could neither be confirmed nor rejected using the survey of the LRMP process. When participants were asked about issues on which they had been unable to reach agreement, the only examples they provided concerned issues on which the parties were so entrenched in their positions that they found it difficult to make concessions. No examples were obtained of issues that were left unresolved because the costs of negotiation were perceived to be too high.

> **Hypothesis 3**: If the policy that the government will select in the absence of collaboration is known to the parties, the outcome they adopt will be strongly influenced by that policy even if the parties reach consensus through open and unfettered bargaining.

In order to test Hypothesis 3, the researcher must have information about the parties' expectations concerning government policy. The LRMP survey is unusually suited to the provision of such information as, at the beginning of each LRMP process, a government agency known as the Regional Protected Areas Team, RPAT, recommended a set of candidate sites for protection within each district. Although there was a strong presumption that the government would adopt these recommendations if the committees were unable to reach consensus, the committees were free to choose alternative sites as long as they met the minimum requirements for total protected area. These candidate sites acted as an objective indication of the government's "fall back" position; and, because that position consisted of a large number of attributes, it potentially created a bargaining lens within which negotiations could occur.

The responses to the LRMP survey provide substantial support to Hypothesis 3. All but two of the participants who answered a question about the influence of the candidate sites indicated that, although those suggestions were not always incorporated directly into the final plans, their presence helped to make it easier for the parties to reach agreement. Some typical comments were: "The info provided by RPAT made a starting point for the [protected area] discussions." "Without the direction to set the target and range of the protected areas, the table would never have been able to come to consensus." "… [B]ecause of 'Give a little, take away a little', consensus was reached." "We disagreed with some candidate areas and added others." "We took the RPAT recommendations into account but …. they did not play a major role in our planning process." The two dissenting respondents both felt that the government had forced its views on the parties, giving them very little leeway. One argued, for example, that RPAT "… did not make 'recommendations.' The percentage was fixed by government." The other was even more direct: "Protected areas were forced on us, it was a bunch of bull***."

> ***Hypothesis 4***: If the parties are uncertain about the policy that will be imposed if they fail to reach agreement (and they are risk averse), but share similar perceptions concerning the probabilities that various policies will arise, they will have a greater incentive to reach agreement than if they were certain about the default outcome.

This hypothesis consists of two components: that the parties are more likely to reach agreement (i) if they are uncertain about the government's fall back position and (ii) if they share similar perceptions concerning the probabilities that the government will adopt such positions. Unfortunately, in a retrospective survey, such as the one used here, it is extremely difficult to test the second of these components. Nevertheless, it was possible to collect some information concerning the first component as, even after the RPAT's had proposed their candidate sites, the parties still faced considerable uncertainty about other aspects of the government's fall back position.

Specifically, in a question about the impact of expectations about government policy,[10] sixty percent of respondents indicated that they had been induced to reach agreement out of concern that the outcome the government would choose would be unacceptable to both parties. Typical comments included: "[The] committee … always lived under the threat that if we didn't reach consensus, government would make the decisions (which most feared would be worse)." "The group as a whole was not sympathetic to what the government would have chosen." "I was worried that government might ban all hunting if no consensus was reached." "[T]he timber and pole harvest areas were a big concern … we felt should be dealt with by our committee rather than leave it to outsiders who were unfamiliar with the area." "There was an underlying threat on every part of the plan, if we could not have consensus of the LRMP, government would create the plan – made in Victoria [the provincial capital] – not good!"

The remaining respondents can be divided into three groups: those who felt that they had been pressured into adopting whatever the government wanted; those who responded that they refused to pay attention to government preferences; and those who indicated that the parties simply left unresolved issues to the government to decide. As these three groups combined were outnumbered by those in the majority group, however, it appears that most respondents felt that uncertainty about government preferences was an important inducement to negotiation.

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[10] Unfortunately, most of the answers were not useful for this purpose, as the respondents provided insufficient information. For example, they often simply replied that expectations concerning government policy "was important," but provided no details. As a result, the discussion in this section is based on only fifteen responses.

Hypothesis 5: If the parties have inconsistent expectations concerning the policy that will be imposed if they fail to reach agreement, there is a strong presumption that collaboration will fail.

As with Hypothesis 4, a formal test of Hypothesis 5 would require the collection of prospective information about the parties' expectations – something difficult to do using a retrospective survey. Nevertheless, the parties' responses to a question about the reasons they failed to reach consensus on some issues provided insight into this issue.[11]

Most importantly, it was clear from the responses that the primary reason the committees were unable to reach agreement on mineral exploration rights in many districts was that representatives of the mining industry held significantly different perceptions of the government's "fall back" position than did the remaining members of the table. It appears that whereas most members of the committees wished to place severe restrictions on exploration and extraction rights, the mining industry felt that the government would approve a much more liberal menu of those rights. Indeed, objective evidence of this difference in expectations was provided when the B.C. & Yukon Chamber of Mines asked its members to withdraw from the LRMP process and turned, instead, to direct lobbying of the government (B.C. & Yukon Chamber of Mines, 1999).[12]

Additional, indirect evidence comes from respondents who indicated that agreement could not be reached in many circumstances either because the position of at least one of the (other) parties to the negotiations was "entrenched;" or because the respondents felt that their group could not make further concessions without "losing face." It seems unlikely that both parties to a negotiation would choose to remain intransigent, even in order to save face with their constituents, if they felt that the policy that would be chosen by the government would leave either of them significantly worse off than would the policy they could obtain through negotiations. That is, the willingness to choose "entrenchment" might be interpreted as evidence of a dissonance in expectations – a dissonance that discourages collaborative efforts.

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[11] The question was: "Why do you feel the committee was unable to reach agreement on [some] issues?" In three of the districts, we were told that the committee had reached consensus on all issues. Many of the remaining respondents did not answer this question. That left only seventeen usable responses.

[12] Subsequently, however, the Chamber of Mines re-entered the LRMP process (B.C. & Yukon Chamber of Mines, 2003).

Hypothesis 6: If the government "frames" the issues to be negotiated (by restricting the set of possible outcomes), it may increase the probability that the parties will reach consensus. However, it will, at the same time, increase the probability that both parties will be dissatisfied with the outcome they have "chosen."

The LRMP process provides clear evidence for the first half of Hypothesis 6, concerning the effect of framing on the probability the parties will reach consensus; but only weak evidence for the second half, concerning the probability that the parties will be dissatisfied.

Before most of the LRMP processes began, the government sent strong signals concerning the minimum percentage of each district that should be set aside as protected areas; and it introduced a Forest Practice Code that required the logging and ranching industries to meet detailed requirements for the protection of forest ecological systems.[13] In the case of the protected areas directive, it was clear that the constraints had the effect predicted by Hypothesis 6. That is, most of the respondents to the LRMP survey indicated that the constraints had made it easier to reach consensus because those constraints had reduced the number of issues over which bargaining could occur.[14]

With respect to the Forest Practice Code, most participants appear to have felt that the committees were free to "contract around" the provisions of the Code. Nevertheless approximately three quarters of the respondents indicated that those provisions reflected their own views sufficiently closely that they were able to use the Code as the basis for reaching agreement. The remaining individuals replied that, in their view, the provisions of the Code differed sufficiently from their committees' final recommendations that it could not be said that the Code had played an important role. In short, as the "frame" in this case was flexible, it had the predicted effect only in those cases in which it could serve as a convenient starting point from which negotiations could proceed. When the

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[13] The initial legislation was known as the Forest Practices Code of British Columbia Act, R.S.B.C. 1996. The current, revised version of this Act has 252 sections, covering matters such as soil conservation, construction of roads, use of planned fire, grazing rights, removal of fire hazards, and limitation of the spread of noxious weeds. Only the Kamloops LRMP had been completed before the introduction of the Code.

[14] Respondents were virtually unanimous in this view. Two dissenting opinions came from one district where the respondents complained that the RPAT had been so active in arguing that particular areas should be designated as protected areas that there was little role left for the LRMP committees.

practices established by the Code differed significantly from those preferred by the parties, its effect on bargaining was less pronounced.

With respect to the second part of Hypothesis 6 - that government "framing" of the issues would leave the parties dissatisfied with their negotiated outcomes – significantly different responses were received when participants were questioned about protected areas than when they were questioned about the Forest Practice Code. Whereas the majority of respondents – including all of those who identified themselves as environmentalists or as representatives of the mining industry – were dissatisfied with the effect that government regulations had on the percentage of their districts that were ultimately protected, a majority of respondents were satisfied with the effect that the Code had on their negotiations. It appears that the provisions of the Code were sufficiently reflective of the parties' preferences that they did not object to its effect upon the negotiated outcome; something that could not be said about the amount of land recommended as protected areas.

> *Hypothesis 7*: The parties' willingness to enter collaborative processes, and their ability to reach mutually-beneficial outcomes, will not be affected by the parties' relative economic or political powers (as long as consensus is the decision rule).

A full examination of Hypothesis 7 would require a comparison across a large number of collaborative processes, with different institutional settings – a meta-analysis, perhaps. Nevertheless, it can be reported that in the LRMP process those with the greatest economic power – representative of the various forest products companies[15] – and the greatest political power – the environmental groups[16] – were willing and able to negotiate complex agreements with representatives of groups that lacked either form of power – such as trappers, ranchers, off-road vehicle users, and residents of small urban centers. Only one group – the mining industry – left the negotiation table; and that appeared to be because they felt that the other groups had failed to recognize what the government's

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[15] Forestry is British Columbia's most important industry.

[16] At the time the LRMP negotiations discussed in this paper took place, the New Democrats, a left-leaning party, had a majority government in British Columbia.

position would be on exploration rights, not because they considered themselves to have so much power that they could afford to ignore the collaborative process.

5. Summary

It is the contention of this paper that most models of environmental collaboration have been obtained using inductive reasoning – that is employing a scientific approach in which the researcher first "immerses" him- or herself in data concerning the phenomena to be explained and then extracts from those data a simplifying model of the underlying processes. Following from the methodological writings of authors such as Popper, Kuhn, and Friedman, it was argued that a more satisfactory method of developing scientific models may be to employy <u>deductive</u> reasoning – that is an approach in which the researcher first derives a model from a basic set of simple (but not necessarily "realistic") assumptions about human behavior and then tests the hypotheses derived from that model against empirical observations.

The purpose of this paper was to show that it was possible to use deductive reasoning to derive a simple model that was capable of generating a rich set of testable hypotheses about the environmental decision-making process. This model, which was based on the Edgeworth box, was employed to derive eight hypotheses that were then tested against the responses to a questionnaire administered to sixty-nine individuals who had participated in the development of British Columbia's Land and Resource Management Plans, (LRMP). In general, it can be concluded that those responses were consistent with the hypotheses.

Nevertheless, the model developed here was unable to incorporate many issues of importance to the debate about collaborative decision-making. For example, the Edgeworth box does not provide a model of the process by which participants move from the BATNA to a mutually-acceptable outcome. Perhaps bargaining theory or collaborative game theory could fill this gap. Similarly, additional modeling will have to be provided: of the method by which the BATNA is established; of the negotiation process that parties will follow if the government does <u>not</u> promise to uphold the parties' agreements; of the means by which disputes are resolved <u>within</u> the groups that are

represented at the bargaining table; and of the impact that transactions costs have on the ability of affected groups to obtain representation in the bargaining process.

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