

A MODEST PROPOSAL FOR ASSESSING SOCIAL IMPACTS OF NATURAL RESOURCE POLICIES

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ABSTRACT

A method is outlined for comparing social impacts of alternative natural resource policies. The technique consists of (i) two value criteria used to identify impacts of policies, (ii) a modified Delphi procedure for estimating impacts, and (iii) a procedure for ranking alternative policies from most to least desirable. Implications of the technique are briefly discussed.

An ethical theory is required to judge changes as negative or positive! Chemistry, physics and the science of ecology acknowledge only change, not valued change.

Arne Naess, Ecology, Community, and Lifestyle

Techniques have been developed for estimating the economic costs and benefits of alternative natural resource policies, programs, and projects (e.g., [1-3]). These techniques often assume that different groups in the impacted population will be affected in similar ways. This assumption is rarely defensible because the well-being of some groups is almost always damaged more than that of others. More importantly, many impacts are simply not reflected in marketplace exchange [4-7].

Social impact assessment (SIA) can be viewed as a technique for incorporating non-market social values into the assessment of alternative policies, programs,

and projects prior to their actual implementation (e.g., [8-13]). Most SIA research to date has emphasized field study problems [14-17], the development of analytical frameworks for identifying impacts [18, 19], the identification of types of social impacts associated with policies [20], and the development of methods for identifying and assessing social impacts [14-16, 18, 19, 21-23]. Little work exists on the assessment of natural resource policies [24-27], and a general procedure for assessing the non-market social impacts has not emerged. This article attempts to fill this gap by presenting a technique for assessing natural resource policies.

The proposed technique consists of three components:

1. Two measurable value criteria ("conflict polarization" and "futures forgone") for identifying impacts associated with management alternatives;
2. A modified Delphi procedure, based on public involvement, for estimating actual impacts of management alternatives in light of the two value criteria; and
3. A weighting procedure for ranking alternatives from most to least desirable, according to impact estimates, so that results can be integrated with traditional economic and technical analyses.

The first section of this article discusses the problem of defining social impacts and a proposed solution to the problem. The second section provides an overview of procedures for estimating impacts associated with natural resource management alternatives. The third and four sections outline specific procedures used to estimate the social impacts of alternatives in terms of the two value criteria. The fifth section considers the weighting procedure used to rank management alternatives from most to least desirable. A discussion of the overall value of the method concludes the article.

DEFINING SOCIAL IMPACTS

Assessment of natural resource management strategies raises the question of valuation: What is to be preferred and why? It is not possible to distinguish between good and bad management alternatives without some value criterion defining social well-being [7, 28-32]. Given the existence of a logically consistent and defensible value criterion and valid and reliable measurements of the criterion, it is possible to compare how proposed management alternatives would affect the value criterion.

Defining social well-being is problematic and is often skirted by analysts. The development of relevant and defensible value criteria presents serious problems for several important reasons. Solutions for some groups are problems for other groups. Intensity of gains and losses differs between groups. People change their minds over time. Social well-being cannot, in any event, be defined in terms of majority preference. Arrow has demonstrated that where there are at least two

choosing parties and three or more alternatives from which to choose, it is not possible to construct a decision rule that will yield stable results reflecting a population's optimum well-being [23].

The value question has received little attention in the SIA literature. Most reviews of the state of SIA either ignore the role of values in SIA or seem to defer to the valuational judgments of experts or decision makers (e.g., [8, 13, 34]). Dietz calls attention to the problem [14-16] and offers a solution based on Herbermas's [35, 36] concept of "unconstrained discourse": all interested parties should be actively involved in the identification and assessment of social impacts. The value problem is resolved through a procedural process based on the consent of interested parties. However, since such discourse would be conducted in a political context constrained by the requirement that action take place in a timely fashion, the most likely form of consent to emerge is majority consent. Dietz's recommendation is not a defensible solution to the value problem, because minority views would almost certainly be suppressed by the majority. In other words, Dietz's proposed solution relies on majority preference and, as noted above, majority preference is not a defensible solution to the value problem.

If majority consent or preference is not a defensible criterion for distinguishing between desirable and undesirable policies, what value criterion should be used? A defensible solution to the problem centers on distinguishing between two types of choice: prescriptive choice and context of choice. Prescriptive choice refers to people prescribing not only for themselves but for others, and it is subject to the problems mentioned above. Context of choice, on the other hand, refers to the structure of choice opportunities from which people prescribe for themselves their own preferences. This distinction provides the basis for sidestepping issues associated with aggregating individual preferences identified above and represents a defensible basis for defining value criteria that can be used to distinguish between policies.

Context of choice refers to the array of choice opportunities available in a given social structure and located on a defined geographic unit. Desirable alternatives are those that expand the context of choice. Although more choice cannot be defined as necessarily better [37], it is reasonable to say that policies that affect the structure of choice in ways that fulfill defensible value criteria are more desirable than others.

Two criteria are used to determine how policies would affect choice context: conflict polarization and futures forgone. Each attribute refers to a characteristic of the structure of choice opportunities available to individuals and groups. Conflict polarization refers to the extent that a policy will polarize groups pursuing different activities. Futures forgone refers to the extent that a policy will reduce futures for activities. Desirable policies are those that reduce conflict polarization and forgo the fewest activities [38].

Social Conflict Cleavages and Social Well-Being

Social conflict cleavages are divisions between groups over values that create fronts of mutual opposition. Conflict cleavages cannot be eliminated from social life nor would we necessarily want to eliminate them because they have positive functions [39]. The important question is not whether conflict exists or how it might be eliminated, but how conflict cleavages are organized in relation to one another. Social conflict cleavages are conceptualized as ranging along a continuum from overlapping to cross-cutting (see Figure 1).

Overlapping conflict cleavage — This situation exists when opponent groups are cleaved by differences on all significant value fronts or issues of importance. Adversaries on one issue are opponents on all important issues. There are no cross-cutting attachments. There is no common ground for compromise and no incentives to negotiate, because the situation is viewed by participants in zero-sum terms. Threat levels are high. Each opponent group develops cohesion around a clearly identified out-group threat, and each side cashes in its available resources to stop the opponent group from advancing its values.

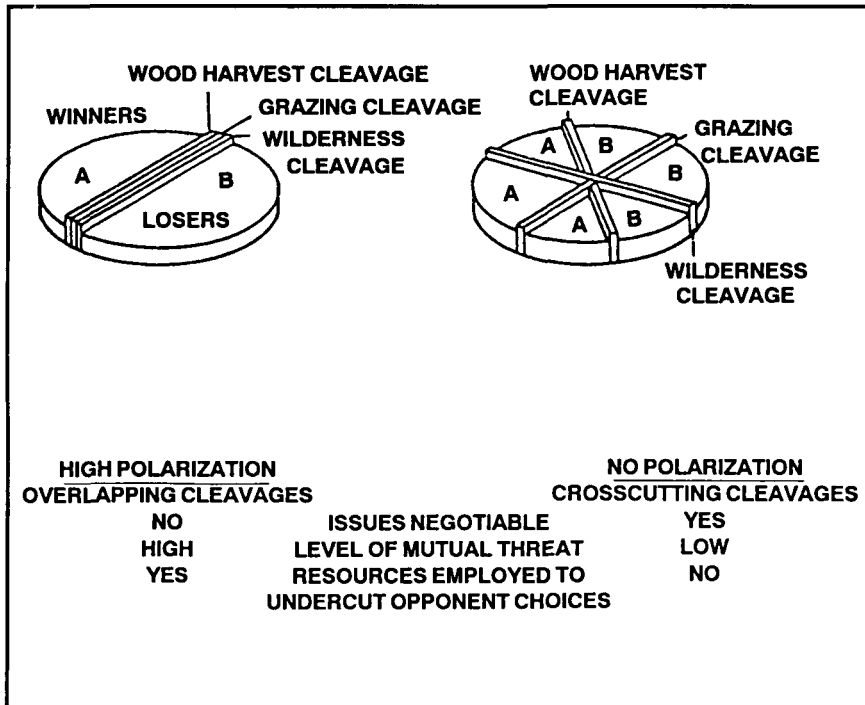


Figure 1. Meaning of conflict polarization.

Overlapping cleavages create high polarization and undercut social well-being. It may not be possible to prescribe that spending X dollars to achieve goal A will yield more net well-being than spending Y dollars to achieve goal B. But it is possible to say that when group conflict becomes highly polarized, social well-being is reduced.

Cross-cutting cleavages — This pattern exists when opponent groups are in conflict with one another over some cleavage fronts, but allied in a common cause on other significant conflicts. Parties in disagreement over one or more issues find shared attachment when they approach other issue areas. Cross-cutting cleavages stitch opponent groups together by facilitating the willingness of groups to negotiate and seek grounds for compromise [39, p. 72; 40]. Total threat to a group by another group is precluded. Multiple involvements in cross-cutting cleavages prevent polarization on any one axis and keep groups open to ideas and innovations from sometime allies.

Cross-cutting cleavage patterns are preferred to overlapping ones because threat levels among opponents are kept low and conflicts are negotiable. To insert conflict, associated with support for and opposition to a management strategy, on a cross-cutting vector is to earn merit for an alternative. To insert a new conflict on a vector that polarizes (overlaps) existing conflicts is to lose merit. Therefore, social well-being is served when cross-cutting cleavages are established [41, 42].

Futures Forgone and Social Well-Being

Futures forgone addresses the question: Who will be disadvantaged if an alternative is implemented? One key way to help or hurt people is to support or undercut futures for their activities. A forgone future means that implementation of an alternative will cancel futures for activities, thereby undercutting the opportunity for individuals to pursue such activities. Social well-being is served when futures for choice opportunities are increased or are forgone as little as possible [43-45].

Futures forgone consists of three dimensions:

1. *Scope of Loss*: What proportion of an activity will be lost if the designated management alternative is implemented?;
2. *Intensity of Loss*: How much will the lost future be missed?; and
3. *Duration of Loss*: How long will it be before the forgone activity can be returned to its original condition after the alternative has been terminated?

An alternative that forgoes futures to a greater scope, with a greater intensity, and for a longer duration undercuts social well-being more than an alternative that has lower values of forgone futures associated with it.

Criteria for Choice

Management alternatives are assessed in terms of their estimated impact on the structure of social conflict between groups, and on the key activities engaged in by groups. The more a proposed alternative increases polarized conflict and forgoes the futures for activities, the more the context of choice is diminished and social well-being is undercut. Those alternatives that reduce conflict polarization to the greatest extent and forgo the fewest futures for key activities are preferred.

ESTIMATION PROCEDURES

Analysis of alternatives consists of obtaining data on social conflict and forgone choice opportunities. Such data are generated from estimates made by knowledgeable informants. Details on the generation of data on conflict and futures forgone are contained in subsequent sections. General features of the estimation process are discussed in this section.

Modified Delphi Procedure

Informants familiar with the planning area and the proposed management alternatives make estimates following procedures described below. However, since any group of individuals may be subject to hidden fears, distorted or incomplete information, or the fear of ridicule from others, it is important that the estimation process minimizes distorting factors and maximizes the flow of information to members of panels. To create an environment for maximizing reliable and valid estimates, a modified version of the Delphi technique is used [46-48].

This estimation technique consists of a series of sequential interrogations based on the feedback of best estimates and focused on areas of difference. It consists of seven steps:

1. Informants who are knowledgeable about local social, ecological, and geographical conditions are selected.
2. Informants are briefed about the specific nature of the proposed management alternatives.
3. A list of significant activities for the planning area is formulated and presented to informants.
4. Informants, working independently of one another, estimate conflict patterns and losses of activities associated with each alternative and pass them back to the coordinator.
5. The coordinator sets aside those items on which agreement occurs and passes back those items to panel members on which disagreements have been revealed.

6. Participants examine comments given as reasons for estimates made by others and then render once again a best estimate.
7. Within the course of two or three rounds, estimates typically converge, and where judgments fail to converge, reasons for differences emerge.

This procedure provides an opportunity for significant and authentic involvement of the public in the consideration of management alternatives. The procedure represents a form of public participation in which participants estimate what will likely happen under each alternative being considered and not what they would individually or collectively prefer to have happen. Although individuals of different persuasions can be expected to disagree greatly over what they would prefer, they can be expected to arrive at reliable estimates of what will happen regardless of their own preferences. That is, panel members should be able to agree on which groups, engaging in specified activities, will support or oppose a proposed alternative or lose a future under that alternative.

Advance Preparation

Seven steps are undertaken prior to the actual initiation of a Delphi estimation exercise. These steps are outlined below.

Define management alternatives — An alternative is a combination of proposed actions designed to affect the flow of human activities and ecological processes over time in an area. Alternatives have to be clearly defined. A well constructed statement of an alternative includes a description of what will be done and the scale of the action.

Three rules should be followed in defining alternatives:

1. Prepare written summaries of management alternatives, since lack of clarity is the single greatest threat to the reliability and validity of panel estimates;
2. Do not designate a substantive heading for the proposed alternative, since this may create negative or positive bias (e.g., nonvoluntary water conservation by irrigators). Identify the alternatives only by letter and/or color (e.g., Alternative A-Blue, Alternative B-Orange, and Alternative C-Green); and
3. Use the same management alternatives in the social conflict and futures forgone analyses. Failure to hold the proposed alternatives constant for both parts of the exercise will mean that the results cannot be integrated in any meaningful fashion.

Three water management alternatives presented for illustrative purposes are as follows:

1. *Alternative A*: Continue existing practices of water and agricultural management in both the private and public sectors;

2. *Alternative B*: Implement advanced water technologies and strict water conservation laws, prohibit supplemental wells, and limit kinds of crops irrigated; and
3. *Alternative C*: Provide new incentives for farmers that practice water conservation measures, and adopt technologies that increase water use efficiency.

Determine boundaries of planning area — Careful delineation of planning areas is critical when assessing the impacts of management alternatives. Boundaries must be drawn to reflect the major networks within which social, political, economic, and cultural exchanges take place. Analysis requires two units: a primary planning area, and a larger secondary planning area (see Figure 2). The primary planning area is the land area designated as being subject to planning manipulations. The secondary planning area includes the primary planning area and the larger encompassing land base that offers some of the choice opportunities found in the primary area. The distinction between primary and second planning areas is critical for estimating impacts: the conflict analysis is based on the primary planning area, and the futures forgone analysis is based on the primary and secondary planning areas.

Define significant activities — Significant activities supported by the primary planning area are identified. The list of activities must be constructed to reflect occupational, recreational and other important activities of groups found in the planning area. Identification of activities should be made in consultation with knowledgeable informants in the area. In instances where the analyst is uncertain of the accuracy of a given list of activities, participants in the Delphi exercise should review the list.

Any number of activities can be used but the analysis becomes increasingly cumbersome as the number of activities increases. Consequently, only the most important activities in the primary planning area should be identified and used in the analysis. Illustrative activities are presented in Table 1.

Select knowledgeable informants for panels — Informants are selected to serve on panels (each consisting of four to seven members) to make estimates of the social impacts of alternatives. Panel members are selected on the basis of knowledge of the primary and secondary planning areas. Participants should be chosen to ensure that major interests in the planning area are represented. Prior to the actual exercise, all participants should respond to a questionnaire that elicits the following information: demographic characteristics (e.g., age, sex, education, occupation, and years of experience in the planning unit) and ideological commitment (e.g., environmental concern versus commodity production). This information is used to assign participants to specific panels of interest.

After participants are assigned to specific panels, each participant is assigned a three-digit number. This number identifies each participant with his/her written

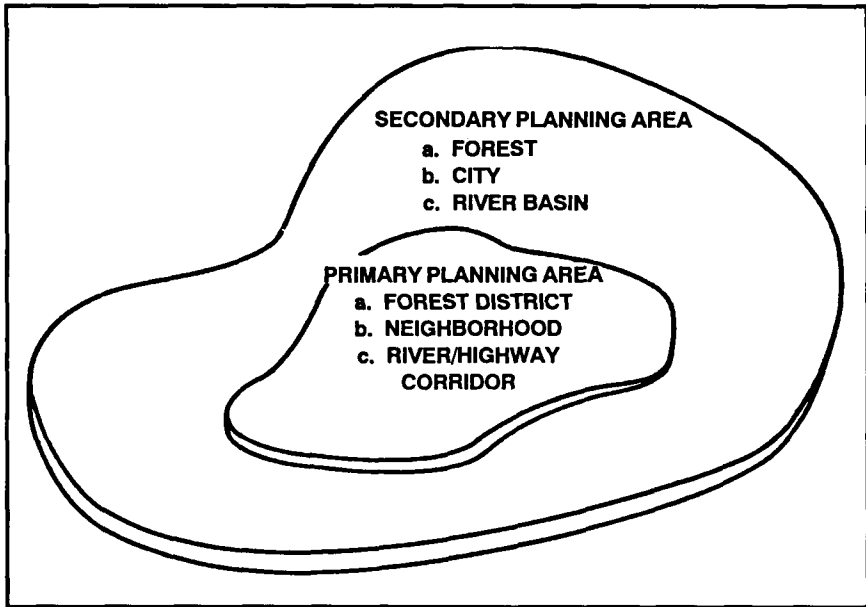


Figure 2. Illustration of primary and secondary planning areas.

Table 1. Illustrative List of Activities Supported by Primary Planning Area

Activities	
1. Dryland agriculture	6. Meat packing
2. Irrigated agriculture	7. Retail sales
3. Industrial water use	8. Motels and restaurants
4. Municipal water use	9. Construction
5. Cattle feeding	10. Energy development

responses to the exercise. By assigning a number to each participant, anonymity can be maintained during the process in which estimates are aggregated, recorded, and reported back to the panel. Panel members should be given their number upon arrival and told to maintain its confidentiality. Here is an example of how participant numbers could be assigned: Panel 1: 110, 111, 112, . . . ; Panel 2: 120, 121, 122,

Determining how to return estimates for review — There are two ways to return estimates for review to panelists. One method involves the coordinator reading estimates to panelists, who record such estimates for subsequent review during the

round. The second method involves the use of a staff to record panelists' estimates on a tabulation sheet. Each sheet is duplicated for member's review in a subsequent round.

The particular method selected depends on three things: the organizational nature of the specific exercise, the size of the coordinating staff, and the availability of duplicating equipment. The first method is used when the exercise is arranged so that the results of a round cannot be recorded and copies cannot be made for each participant in between rounds (e.g., during a lunch period or overnight), there are not enough staff to carry out the task quickly and efficiently, or a duplicating machine is not available. The second method is recommended when the exercise is arranged in a way that allows the staff to make copies of estimates in between rounds.

Secure physical facilities — Procedures can be adopted to many settings. However, certain things must be provided to ensure a successful exercise. These include a common meeting room for briefing participants. A separate working area for each panel is essential. Facilities should be arranged so that panel members can speak to one another without disturbing members of other panels. A private working area should be provided for each panelist to protect anonymity. An individual desk and chair for each panelist is preferred, but a large table with a participant on each side is acceptable.

Materials and score sheets — It is critical for the success of the exercise that instructions, materials, and score sheets are straightforward and require little explanation from the panel coordinator. The following items are needed and should be placed at the work area of participants prior to each exercise. Specific procedural instructions for the social conflict and futures forgone exercises are discussed in detail in subsequent sections.

1. Response sheets for specific exercises. Regular lead, red, and blue pencils are also provided for each participant. The coordinator distributes lead pencils for round 1, red pencils for round 2, and blue pencils for round 3. Use of different colored pencils enables participants to note quickly round to round changes in estimates made by other panelists;
2. 3"-by-5" cards. Each participant should be provided with a packet of comment cards. Comments can be written to other participants during rounds 1 and 2. Participants must identify themselves only by their assigned three-digit number. During the same round, the comment cards are returned to the coordinator who then reads them to all panel members, taking care to refer to the participant comments only by their designated number;
3. A map of the primary and secondary planning areas; and
4. Summaries of proposed management alternatives.

ESTIMATING CONFLICT CLEAVAGE PATTERNS

Overview

Conflict is always generated by management decisions as groups take positions of support and opposition to such decisions. The task is to estimate the pattern of conflict associated with each management strategy. Participants complete three stages in the estimation of conflict patterns:

1. Participants are asked to identify significant conflict issues dividing groups in the primary planning area. Working from an initial list of issues prepared prior to the analysis, participants generate a list of significant issues or base cleavages (see lower portion of Figure 3);
2. Following a sequence of Delphi interrogations and iterative adjustments in estimates, participants arrive at judgments about the positions that groups engaged in the major activities of the planning area would take on each of the base issues identified in Step 1 (see upper position of Figure 3); and
3. As a third step, participants consider the conflict cleavages associated with each of the management alternatives. Participants produce in an iterative fashion estimates of positions that groups engaged in particular activities in the planning unit would take toward each management alternative.

Initiating the Exercise

Define an inventory of base cleavages — Base conflict cleavages central to the primary planning unit must be identified prior to the initiation of the exercise. Base cleavages refer to divisions between social groups reflecting differences over values that create fronts of mutual opposition. Cleavages should be clear-cut and expressed in a “for” or “against” form; for example, for or against industry x. Discussion with informants is a way of constructing an initial list of important conflict cleavages.

The initial list of cleavages is used to construct a “hare ballot” to be administered to panelists. Use of the ballot provides the basis for reducing cleavages to a manageable number for subsequent analysis. This is accomplished by having the panelists, on the day of the exercise, rank the issues in order of importance (see Table 2).

Materials — Five to seven hours are required for conducting the social conflict exercise. Six items that should be placed at each panelists’s work place before the exercise begins. These include:

1. Instructional materials;
2. Response sheets and tabulation sheets;

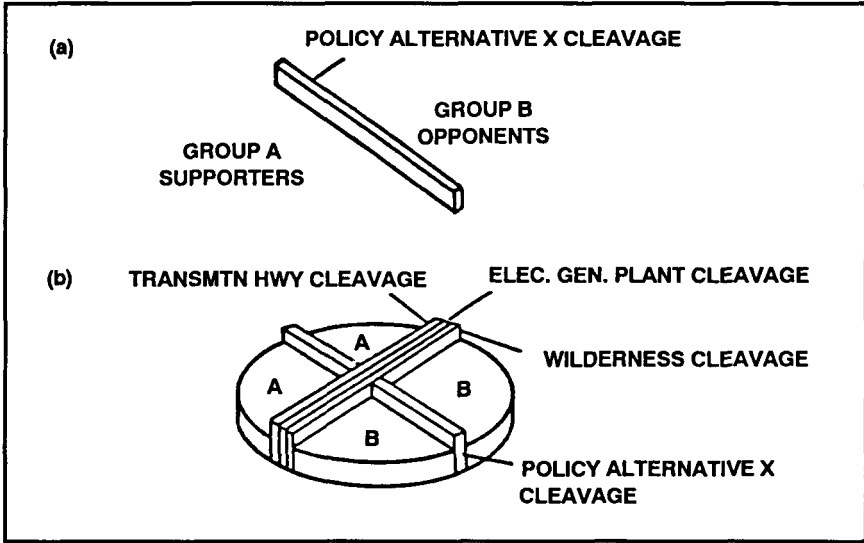


Figure 3. Measuring conflict.

[(a) Determine which groups support and oppose policy alternative X.
 (b) Superimpose policy X cleavage on base cleavages.]

3. 3"-by-5" cards;
4. Map of the primary area under study and surrounding secondary planning area;
5. Summaries of proposed management alternatives; and
6. Writing materials.

Briefing panelists — The following steps should be undertaken in the briefing of panelists:

1. Gather all participants in a common meeting room and extend a brief welcome;
2. Give a brief summary of the proposed alternatives;
3. Administer the hare ballot in the common meeting room. Have each participant rank the selected cleavages in order of importance. Collect ballots from the participants (see Table 2);
4. Compute the results of the hare ballot. While the coordinator is presenting a brief overview of the exercise, an assistant computes the results of the hare ballot; and
5. Give a short overview of the conflict analysis.

Table 2. Example Hare Ballot for Ranking Base Cleavages

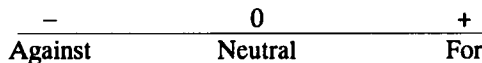
INSTRUCTIONS: Please examine the issues listed below, which have surfaced in public involvement meetings. Rank the issues in their order of importance using "1" to indicate most important, "2" to indicate the second most important . . . , and "10" to indicate the least important.

Cleavage	Importance of Cleavage
1. For or against industry x	_____
2. For or against	_____
3. For or against	_____
4. For or against	_____
5. For or against	_____
6. For or against	_____
7. For or against	_____
8. For or against	_____
9. For or against	_____
10. For or against	_____

Conducting the Exercise

After the participants have been given an overview of the exercise, they should be moved to the room assigned for their respective panels. Instructions provided at the work area should be self explanatory and require little intervention by the panel coordinator. Panelists make estimates regarding existing base cleavages in the planning area, and conflict patterns associated with each management alternative. Details are discussed below.

Estimating base cleavages — Panelists consider the six or seven most important base cleavages generated in the hare ballot (see Response Sheet listed as Table 3). Panelists estimate the position and degree, pro or con, that key activity groups (listed across the side of Table 3) will take toward each issue. Panelists use the following scale:



Estimation rounds are cumulative. During the first round, each panel produces an exploratory first cut. By the end of the second, or, perhaps, third round, one can

Table 3. Response Sheet for Estimating Base Cleavages

Participant No.:						
Issues						
Activities	Issue 1	Issue 2	Issue 3	Issue 4	Issue 5	Issue 6
1. Dryland agriculture						
2. Irrigated agriculture						
3. Industrial water use						
4. Municipal water use						
5. Cattle feeding						
6. Meat packing						
7. Retail sales						
8. Motels/restaurants						
9. Construction						
10. Energy development						

expect a convergence of estimates. This emerging consensus results from both the sharing of individual responses to items on the response sheets and from information provided on comment cards. When two or three rounds have been completed and general agreement has been reached, the panel may wish to forgo further rounds and enter into discussion of specific items on which panel members disagree.

Responses of individual panelists for each round are reported back by either reading estimates to panelists who record the numbers on tabulation sheets (see Table 4) or by disbanding the panels until the next meeting and reproducing the estimates for other participants (see section *Determining how to return estimates for review* above for details). This latter technique is good for a series of evening sessions, but the duplicating time makes the procedures inconvenient for sessions with three rounds to be completed in one day.

Estimating conflict patterns associated with proposed management alternatives — Panelists consider specific management alternatives (see Response Sheet listed as Table 5). Panelists estimate the position that key activity groups and

Table 4. Tabulation Sheet for Establishing Base Cleavages

Participant No.												
Activities/ID Nos. →	Issue 1				Issue 2				Issue 3			
1. Dryland agriculture												
2. Irrigated agriculture												
3. Industrial water use												
4. Municipal water use												
5. Cattle feeding												
6. Meat packing												
7. Retail sales												
8. Motels/restaurants												
9. Construction												
10. Energy development												

organizations (listed across the side of Table 5) will take toward each management alternative. Panelists use the following scale:

-1	0	+1
Against	Neutral	For

Specific procedures followed in the estimation of base cleavages apply to the estimation of the conflict patterns associated with proposed management alternatives. That is, rounds are cumulative and responses are reported back to panelists who record the numbers on tabulation sheets (see Table 6) or by disbanding the panels until the next meeting and reproducing the estimates of each panelist for other panelists.

Analysis of Data

Data analysis consists of six basic steps. Results of an analysis are reported in Tables 7 and 8.

Table 5. Response Sheet for Estimating Impacts of Management Alternatives

Participant No.			
Activities	Alternative A	Alternative B	Alternative C
1. Dryland agriculture			
2. Irrigated agriculture			
3. Industrial water use			
4. Municipal water use			
5. Cattle feeding			
6. Meat packing			
7. Retail sales			
8. Motels/restaurants			
9. Construction			
10. Energy development			

Table 6. Tabulation Sheet for Estimating Impacts of Management Alternatives

Participant No.												
Activities/ID Nos. →	Alternative A				Alternative B				Alternative C			
1. Dryland agriculture												
2. Irrigated agriculture												
3. Industrial water use												
4. Municipal water use												
5. Cattle feeding												
6. Meat packing												
7. Retail sales												
8. Motels/restaurants												
9. Construction												
10. Energy development												

Table 7. Conflict Patterns Over Six Base Issues

Activity Category	Column A			Column B		Column C
	Observed Position			Ideally Expected Position	Deviations from Ideally Expected Position	
	For	Against	Neutral	For	Against	
1. Dryland agriculture	6	0	0			
2. Irrigated agriculture	4	1	1	2.5	2.5	1.5/-1.5
3. Industrial water use	1	0	5	0.5	0.5	0.5/-0.5
4. Municipal water use	3	2	1	2.5	2.5	0.5/-0.5
5. Cattle feeding	2	2	2	2.0	2.0	0/0
6. Meat packing	1	2	3	1.5	1.5	-.5/.5
7. Retail sales	0	2	4	1.0	1.0	-1/1
8. Motels/restaurants	0	5	1	2.5	2.5	-2.5/2.5
9. Construction	2	2	2	2.0	2.0	0/0
10. Energy development	2	4	0	3.0	3.0	-1/1
Total						15

First, a base activity group is selected. The activity group with the fewest neutral positions on base issues (six issues are used in this hypothetical analysis) is selected as a base category. The Dryland Agriculture activity group was used in the analysis reported here and it is found at the top of Tables 7 and 8. Each other activity group or user is conceptualized as taking a position of alliance with, neutrality toward, or opposition to the group engaged in the Dryland Agriculture activity.

Second, the position of each activity user, *vis-a-vis* the Dryland Agriculture activity group for each of the six base issues, is recorded in the column headed Observed Position (Column A) in Table 7. These data represent the number of times participants estimated a particular activity user to be allied with, opposed to, or neutral to the position taken by the Dryland Agriculture group. A number 6, for example, entered under "for Dryland Agriculture" and a zero under "against

Table 8. Comparisons of Estimated Positions on Management Alternatives to Existing Conflict Patterns

Activity Category	Column D			Column E			Column F					
	Alternative A Dryland Agriculture			Alternative B Dryland Agriculture			Alternative C Dryland Agriculture					
	For	Against	Neutral	D	For	Against	Neutral	D	For	Against	Neutral	D
1. Dryland agriculture	-	-	-	-	-	-	-	-	-	-	-	-
2. Irrigated agriculture	X	X	-1	-1	X	X	-1	-1	X	X	-1	-1
3. Industrial water use		X	0	0	X	X	0	0	X	X	0	0
4. Municipal water use	X	X	-1	-1	X	X	0	0	X	X	-1	-1
5. Cattle feeding	X	X	1	1	X	X	1	1	X	X	1	1
6. Meat packing		X	0	0	X	X	1	1	X	X	1	1
7. Retail sales	X	X	1	1	X	X	1	1	X	X	1	1
8. Motels/restaurants	X	X	1	1	X	X	1	1	X	X	1	1
9. Construction	X	X	1	1	X	X	1	1	X	X	1	1
10. Energy development	X	X	1	1	X	X	-1	-1	X	X	1	1
Total			3	3			3	3			4	4

Dryland Agriculture” indicates that the activity group was estimated to support the base group’s position six out of six times.

Third, an expected pattern of support is then constructed (Table 7, Column B): a pattern that would theoretically occur if a perfect pattern of cross-cutting conflict existed. If conflicts were perfectly cross-cutting, one would expect that each activity group would favor the base category position half the time; and half the time, it would oppose the base position. Therefore, given six cleavages on which an activity user is estimated to have taken a non-neutral position, the expected pattern for perfect cross-cutting positions on the conflict fronts is 3/3. In those cases in which activity users are seen as neutral, the expected pattern is only based on positive and negative positions. Consequently, since the Irrigated Agriculture group is estimated to be neutral on one cleavage, the expected pattern for this group is 2.5/2.5.

Fourth, the observed pattern of support and opposition (Table 7, Column A) is then compared to the expected pattern (Table 7, Column B) to determine the deviation between the observed conflict pattern and the ideal cross-cutting pattern (Table 7, Column C). Deviation scores are computed by determining the difference between the number of times a given activity group supported the position of the Dryland Agriculture activity group and the expected value and the difference between the number of times each group category was against the Dryland Agriculture base group and the expected value. Because the number of deviation units is critical, and not the direction of the deviation, signs are ignored and all deviation scores are summed. In the case of Table 7 (Column C), there are fifteen units of deviation from a pattern of pure cross-cutting conflict.

The fifth step of the analysis centers on the question: Given that the activity categories are estimated to assume the conflict patterns reported in Table 7 (Column A), will any proposed management alternative be estimated to introduce more or less cross-cutting conflict? More polarization will be reflected in increasing deviation units from the pure cross-cutting distribution, and less in a reduction of the number of deviation units.

Each proposed management alternative is compared to the existing base conflict pattern presented in Column A of Table 7. The estimated positions are displayed under column headings D, E, and F in Table 8. They contain the conflict profile estimated by the participants to exist under each proposed alternative. A positive value appears if the established group category position would increase the deviation from the ideally expected split; a negative value appears if the established group category position would decrease the deviation; and zero appears if the activity category users are estimated to take a neutral stance.

Cleavage salience, the importance of the cleavage to respective actors, is an important dimension of cleavage analysis. The analysis of salience is not included here. Salience data can be easily generated. Panelists estimate the importance of each cleavage to each actor and each actor’s position. Salience values are then used to weight position values. (See Freeman and Hittle’s use of salience measurements in an earlier conflict analysis [40]).

As a final step, deviation values are algebraically summed across activity categories for each alternative, and a polarization score is derived for each alternative. Scores are recorded at the bottom of Table 8 and suggest the following ranking of alternatives from most to least preferred: Alternative A (3), Alternative B (3), and Alternative C (4). Each alternative is estimated to increase conflict polarization. Alternative C is estimated to be the most polarizing and, therefore, the least desirable. Alternatives A and B increase conflict the least and are judged to be the most desirable.

There is no way, at this time, to estimate how much of an increase in conflict polarization can be tolerated before critical unknown thresholds are exceeded. However, the available evidence suggests that modest increases in polarization can produce substantial reductions in legitimacy among opponents and reduced negotiability of issues [49]. Given the limited knowledge available, the only responsible recommendation is to avoid increasing conflict polarization. This can be accomplished by selecting alternatives estimated to reduce polarization or by revamping the attributes of polarizing alternatives in an effort to reduce their polarizing potential.

ESTIMATING FUTURES FORGONE

Overview

A forgone future means that implementation of an alternative will cancel futures for activities, thereby undercutting the opportunity for people to participate in or choose such activities. As noted earlier, the concept of futures forgone consists of three measurable dimensions, which participants estimate:

1. *Scope of Loss*: Scope represents the proportion of a given activity estimated to be lost in the planning area, if the management alternative were implemented (see Figure 4);
2. *Intensity of Loss*: Intensity represents the extent to which an activity will be missed in the area (see Figure 5); and
3. *Duration of Loss*: Duration indicates the length of time, in years, before the planning area can regain a lost activity, if the proposed alternative were terminated (see Figure 6).

Initiating the Exercise

Materials — A full working day is required for the futures forgone exercise. There are six items that should be placed at panelist's work place before the exercise begins:

1. Instructional materials;
2. Response sheets and tabulation sheets;

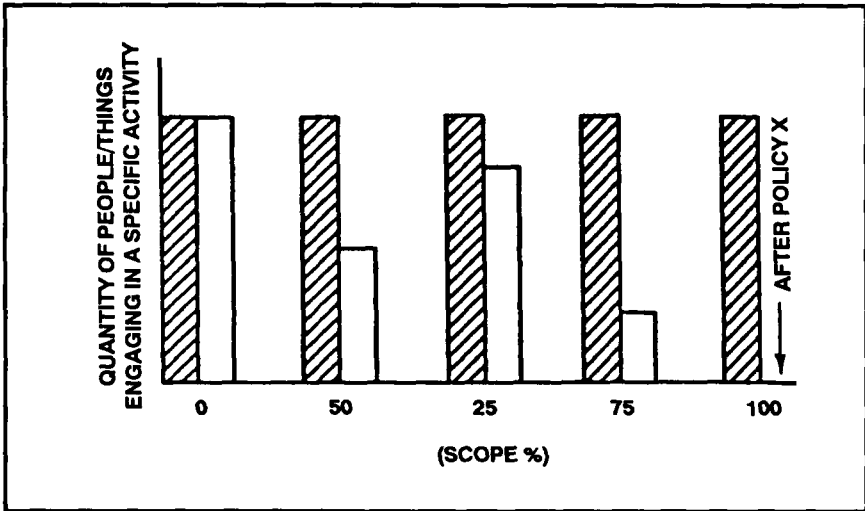


Figure 4. Illustration of scope of loss.
 [▨ = before policy X; □ = after policy X.]

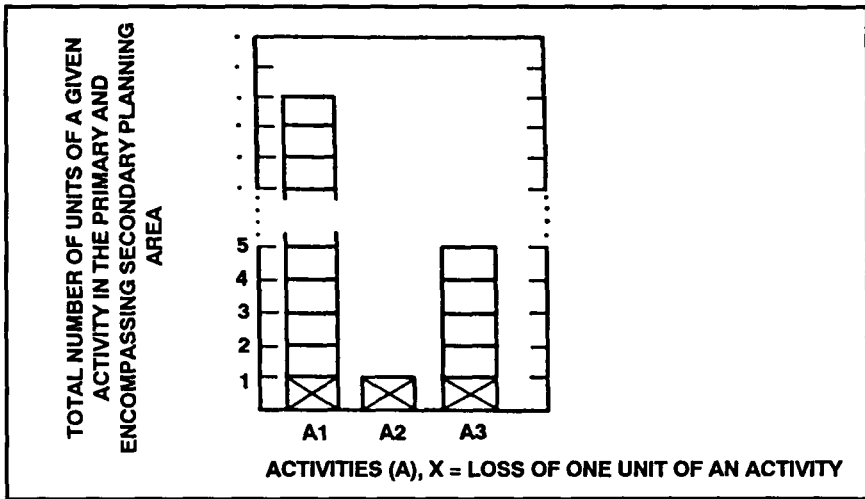


Figure 5. Illustration of intensity of loss.

[(A1) To lose a future for activity A1 in the primary planning area would generate a low intensity score because there are many other units remaining in the secondary planning area to absorb the loss. (A2) To lose a future for activity A2 in the primary planning area would generate the highest intensity score because there are no other units in the secondary planning area available to absorb the loss. (A3) To lose a future for activity A3 in the primary planning area would generate a moderate intensity score because there are some units remaining in the secondary planning area to absorb the loss.]

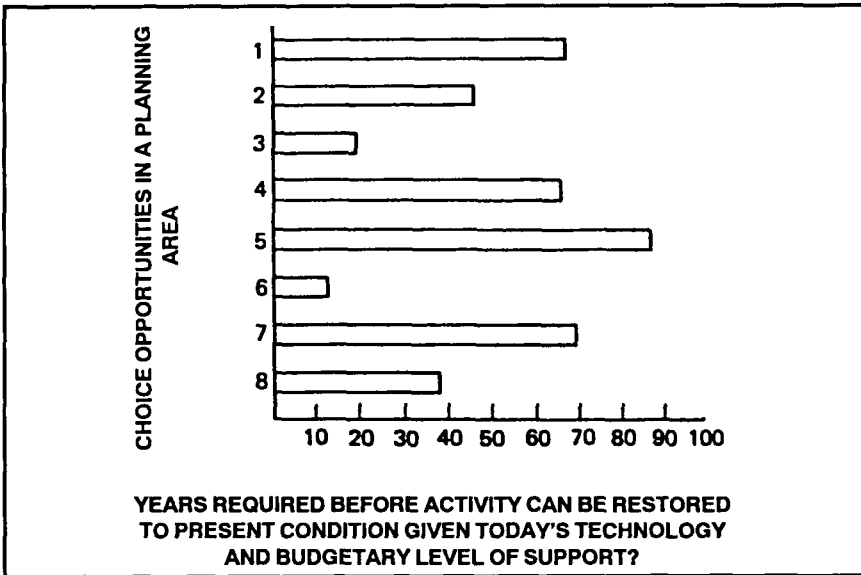


Figure 6. Illustration of duration of loss.

3. 3"-by-5" cards;
4. Map of the primary area under study and surrounding secondary area;
5. Summaries of proposed management alternatives; and
6. Writing materials.

Briefing panelists — The following steps should be undertaken in the briefing of panelists:

1. Gather all participants in a common meeting room and extend a brief welcome;
2. Give a brief summary of the proposed management alternatives, and
3. Give a short overview of the futures forgone exercise.

Conducting the Exercise

After the participants have been given an overview of the exercise, they should be moved to the room assigned for their respective panels. Instructions provided at each participant's work area should be self explanatory and require little or no intervention by the panel coordinator. Panelists make estimates of the scope, intensity, and duration of futures forgone for each activity by management alternative. Details are outlined below.

Estimating scope of loss — Panelists consider each alternative (see Response Sheet listed as Table 5). Panelists estimate the extent to which groups engaged in activities (listed on the side of Table 5) would lose or forgo future activities in the primary planning area, if management alternatives (listed at the top of Table 5) were implemented. In making estimates, panelists identify the proportion of the activity (0-1.00) that would be lost. For instance, an estimate of .00 would indicate that the future for the activity would be unaffected, an estimate of .50 would indicate that the future would be reduced by half, and an estimate of 1.00 would indicate that the future would be totally forgone.

Like the conflict exercise, estimation rounds are cumulative. During the first round, each panel produces an exploratory first cut. By the end of the second or third round, there will typically be a convergence of estimates. Consensus results from both the sharing of individual responses to items on the response sheets and from information provided on comment cards. When two or three rounds have been completed and general agreement has been reached, the panel may wish to forgo further rounds and instead enter into discussion of particular items over which panel members still disagree.

Responses of individual panelists for each round are reported back to panelists by either reading estimates to panelists who record the numbers on tabulation sheets (see Table 6) or by disbanding the panel after each round of estimates and reproducing the estimates of each panelist for other participants. This latter technique is good for a series of sessions no longer than an hour or two, but the duplicating time makes the procedure inadvisable for a session with three rounds of estimates on scope, intensity, and duration of loss to be completed during a one-day exercise.

In order to proceed with intensity and duration, median scope values must be computed at the end of the last round of scope. Then the group's median estimates must be read back to the participants, so that they can begin to estimate intensity and duration values of activities with non-zero scope scores. Obviously, if scope equals zero, there is no intensity or duration of loss. Therefore, panelists only make estimates of those activities that have a non-zero scope value.

Estimating intensity of loss — Panelists consider each alternative (see Response Sheet listed as Table 5). Panelists estimate the extent to which a lost activity (identified as an activity with a non-zero scope value) will be intensely missed, if management alternatives (listed at the top of Table 5) were implemented. The intensity score increases the extent that the forgone activity is not being maintained in accessible places elsewhere in the primary and secondary areas (see Figure 7). The intensity score decreases to the extent that the forgone activity of the impacted primary area is being maintained in the second planning area.

Procedures used in the estimation of scope apply to the estimation of intensity. That is, rounds are cumulative and responses are reported back to panelists who record the numbers on tabulation sheets (see Table 6), or by disbanding the panel after each round and reproducing the estimates for panelists.

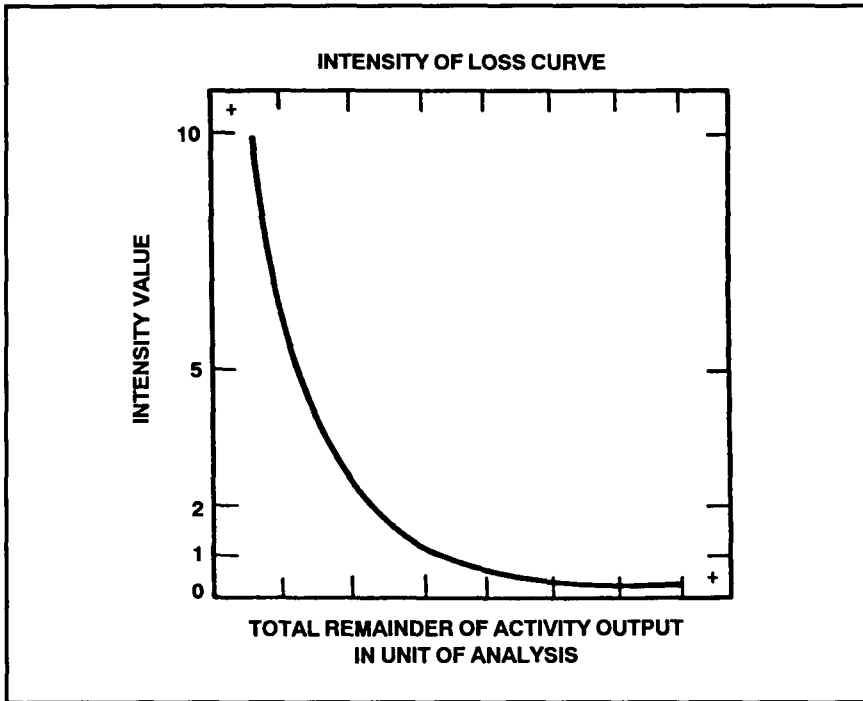


Figure 7. Nature of intensity scores. [Values increase exponentially as total remainder of activity in the planning area diminishes.]

Estimating duration of loss — Panelists consider specific management alternatives (see Response Sheet listed as Table 5). Panelists estimate the number of years before the lost activity (identified as an activity with a non-zero value) can be restored to its present condition, if decision-makers should decide to restore it. For instance, an estimate of 100 would indicate that it would take 100 years for the activity to be restored to its present condition, 50 would indicate that it would take fifty years, and so on.

Procedures followed in the estimation of scope and intensity of loss apply to the estimation of duration. That is, rounds are cumulative and responses are reported back to panelists who record the numbers on tabulation sheets (see Table 6) or by disbanding the panel after each round of estimates and reproducing the estimates of each panelist for participants.

Analysis of Data

Results of an analysis are reported in Table 9. Looking at the table, the reader will see estimates of scope. Where the scope of loss of an activity is a non-zero

Table 9. Illustrative futures Forgone Scores for Management Alternatives

Activity Category	Alternative A			Alternative B			Alternative C		
	S	I	D	S	I	D	S	I	D
1. Dryland agriculture	0.36	10.5	100.0	0	0	0	0.63	10.5	158
2. Irrigated agriculture	.05	1.5	0	0.18	3.3	0.5	0.08	1.5	0
3. Industrial water use	0	0	0	0	0	0	0.05	0.5	0.5
4. Municipal water use	.17	6.5	3.0	0	0	0	0.25	9.8	3.0
5. Cattle feeding	0	0	0	0.25	6.0	2.0	0.13	4.0	3.0
6. Meat packing	.03	2.0	0	0.50	6.3	2.0	0.15	4.0	2.0
7. Retail sales	.25	2.0	.50	0.50	2.0	1.0	0.20	2.0	1.0
8. Motels/restaurants	.16	1.8	.50	0.40	4.2	1.5	0	0	0
9. Construction	.20	1.5	.50	0.20	4.5	2.5	0	0	0
10. Energy development	0	0	0	0	0	0	0	0	0
Total	1.22	25.8	104.5	2.03	26.3	9.5	1.49	32.3	167.5
FF Score	109.00			18.40			174.38		

value, one will see accompanying estimates for intensity and duration. The futures forgone summary scores are computed as follows:

$$FF = \sum S [\sum I/N] + \sum D,$$

where FF = future forgone score for a given management alternative; S = estimated scope of loss of a given activity; I = estimated intensity of loss of a given activity; N = number of activity items with a non-zero intensity score; and D = estimated duration of loss of a given activity.

The formula weights intensity as the most important variable. Scope varies between 0 and 1, whereas intensity increases as an inverse exponential function of the accessible remaining activity opportunities in the second planning area (see Figure 7). Higher scope and duration of loss can be tolerated when intensity of loss is low, because opportunities exist to support the activity in the surrounding area.

The sum of intensity scores is divided by the number of activities with non-zero scores to control for the distribution of intensity values. If the sum of the intensity values should equal 16 by virtue of one very intense loss to one activity category,

which earned a score of 16, the sum of 16 would be divided by 1, and the higher intensity score would stand (16/1). If, on the other hand, the sum of intensity values equals 16 by virtue of 16 activity categories each with a score of 1, the intensity value in the future forgone equation would equal 1 (16/16). Therefore, by dividing the sum of intensity values by the number of activities with non-zero intensity values, the impact of numerous low intensities of loss is controlled and not allowed to inflate the overall score.

Looking at the illustrative futures forgone scores at the bottom of Table 9, we see that Alternative B (18.40) is clearly preferred to Alternative A (109.0) and Alternative C (174.38). Despite the clear-cut interpretation in this example, there are three important points to consider in the interpretation of futures forgone scores.

First, futures forgone scores are measured at the ordinal level. As a result, scores can only be interpreted as providing "greater than" or "less than" kinds of distinction. One cannot interpret a 10 as exactly 2 units greater than a value of 8, but only that 10 units of loss are greater than 8 units of loss.

Second, it is important not only to examine the total scores, but to examine distributions within categories. For example, two management alternatives may have futures forgone scores that are almost identical, but there may be a real difference in how they impact different activities in the planning area.

Third, however revealing the futures forgone scores may be, the analyst must not overlook the fact that the column total could be a result of very different activities being forgone in various proportions, with different intensities and durations. If alternatives are to be reformulated, they should be revised with the intent of reducing high intensities of loss first, followed by alterations to reduce duration and scope of loss.

RANKING MANAGEMENT ALTERNATIVES

Figure 8 illustrates the logic for integrating the results of the conflict and futures forgone analyses. Conflict polarization is more heavily weighted than futures forgone, because it is simply more important. No matter how low the scope of loss, how low the intensity of loss, and how short the duration of loss, if the proposed policy would result in a high level of conflict polarization, social welfare would be reduced in a manner not compensated for by futures forgone scores.

Alternatives that are estimated to increase polarization are sent back for review and possible modification or deleted from further consideration. Those alternatives that are estimated to reduce conflict polarization are subjected to the futures forgone ranking. The preferred alternative is one that reduces conflict polarization and forgoes the fewest futures.

Results indicate that Alternatives A and B are preferred from the standpoint of conflict polarization. Based on the suggested aggregation procedure, Alternative

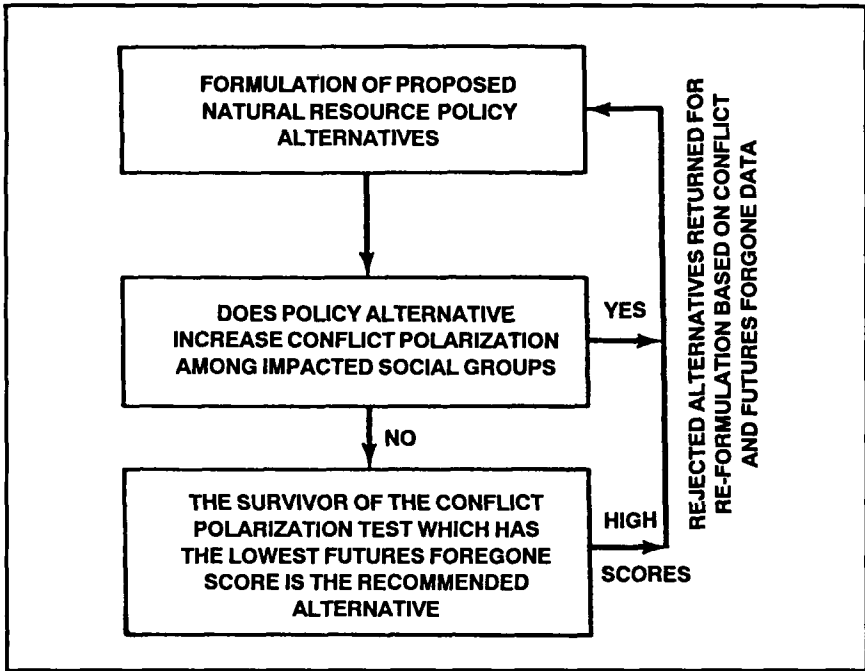


Figure 8. Procedure for ranking management alternatives.

B would be the recommended course of action, because it survives the conflict polarization test and forgoes the fewest futures.

CONCLUSIONS

Much interest has centered on the identification of non-market social impacts of natural resource management policies prior to their actual implementation. Yet, a generalizable procedure has not been developed to assess the social impacts of alternative policies. The procedure outlined and illustrated is an initial step toward the development of such a procedure that can be used to assess policies in various planning units.

The procedure provides the planner not only with a practical and reasonably affordable method of assessing the social impacts of alternative policies, but it provides a mechanism for involving potentially affected groups in the planning process. In addition, the procedure allows the planner to rank proposed policy alternatives from most to least desirable, according to their social impacts, so that results can be integrated with traditional economic and technical analyses.

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