



Choosing Public Participation Methods for Natural Resources: A Context-Specific Guide

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Although public participation has been required of many public agencies and incorporated at all levels in natural resource decision making, little detailed, strategic guidance has been available to help managers understand when and how to involve the public. The Vroom–Yetton model, borrowed from the workplace arena, has shown considerable promise for this purpose. We found, however, that the model needs to be adapted to fit different criteria present in the public natural resource arena. We proposed several modifications to the model for this purpose and demonstrated the use of the revised model.

Keywords citizen input, citizen participation, decision making, natural resources, public involvement, Vroom–Yetton model

Since the 1960s, public participation has become an increasingly important aspect of natural resource management. Public participation at the national level is mandated broadly for federal actions, and general guidelines for its application are specified. State and local governments are incorporating increasing public participation requirements into their activities, yet wide variability remains in the specific requirements. Even if public participation is not required at state and local levels, public expectations pressure managers to provide such opportunities. Often, rapidly changing values have left natural resource managers unprepared and untrained to

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guide public participation processes, and a tool is needed to provide guidance for natural resource managers as to when and how to structure public participation.

Increasingly, attention has been given to a tool developed for private business to help managers determine the level of involvement employees should be given in workplace decision making. This tool, the Vroom–Yetton model, has been found to be a useful tool for guiding public participation in several situations (e.g., Thomas 1990; Thomas 1993; Sample 1993; Daniels et al. 1996). However, the original model was developed based on criteria applied specifically to workplace settings. Previous applications of this model to public participation have made minor modifications to the wording of the model but have not examined the basic structure of the model to determine to what extent its formulation is applicable to the public arena or whether significant modifications to the model are necessary for this purpose.

In our study, we first examined the original formulation of the Vroom–Yetton model and subsequent applications of the model to public participation. We then explored the criteria used to create the model and analyzed the applicability of these criteria to public participation in natural resource decision making. Using the original methodology from the formulation of the model, but with revised criteria, we determined certain changes in the model necessary for appropriate application of the model to public participation in natural resource decision making. Finally, we demonstrated the utility of the revised model by applying it to two decision-making scenarios.

Original Formulation and Adaptations of the Vroom–Yetton Model

Starting in the early 1900s, the business world began to adopt principles of scientific management. The focus was on efficient division of labor, based on the results of scientific research, such as motion studies. In the transition from trade guilds, economic incentives were offered to offset the anticipated tendencies toward worker laziness. Slowing productivity growth and mounting trade deficits, however, raised concerns about the adequacy of these scientific management methods (Vroom and Jago 1988). In the 1930s, the concept of power sharing and participation began to resurface in the academic world. Participative management was proposed by behavioral scientists in the 1950s and 1960s. The hypothesized benefits of increased worker participation included an improved ability to overcome resistance to change, increased motivation of workers, and the instillation of a community of purpose throughout the organization (Vroom and Yetton 1973; Vroom and Jago 1988). Incorporating participation in the business world proved problematic, however, because “essentially, no single approach, whether autocratic, consultative, or totally participative, can be effectively employed with all subordinates for all types of activities” (Vroom and Jago 1988).

A model was needed to indicate which participative approach might prove most effective in a given situation. In 1973, Victor Vroom and Philip Yetton introduced a contingency decision-making model for the business world. The model was intended to aid in determining what level of participation by subordinates would improve the quality and acceptance of decision making in the corporate business setting. It operated by having a manager answer a series of seven questions (Figure 1), leading through a dichotomous decision tree, with the results indicating the desired level of employee participation in a decision.

The Vroom–Yetton model has been extensively tested in the business setting. Vroom and Jago combined results from six studies, including independent studies, conducted from 1978 to 1987 to examine a total of 1545 decisions (Vroom and Jago

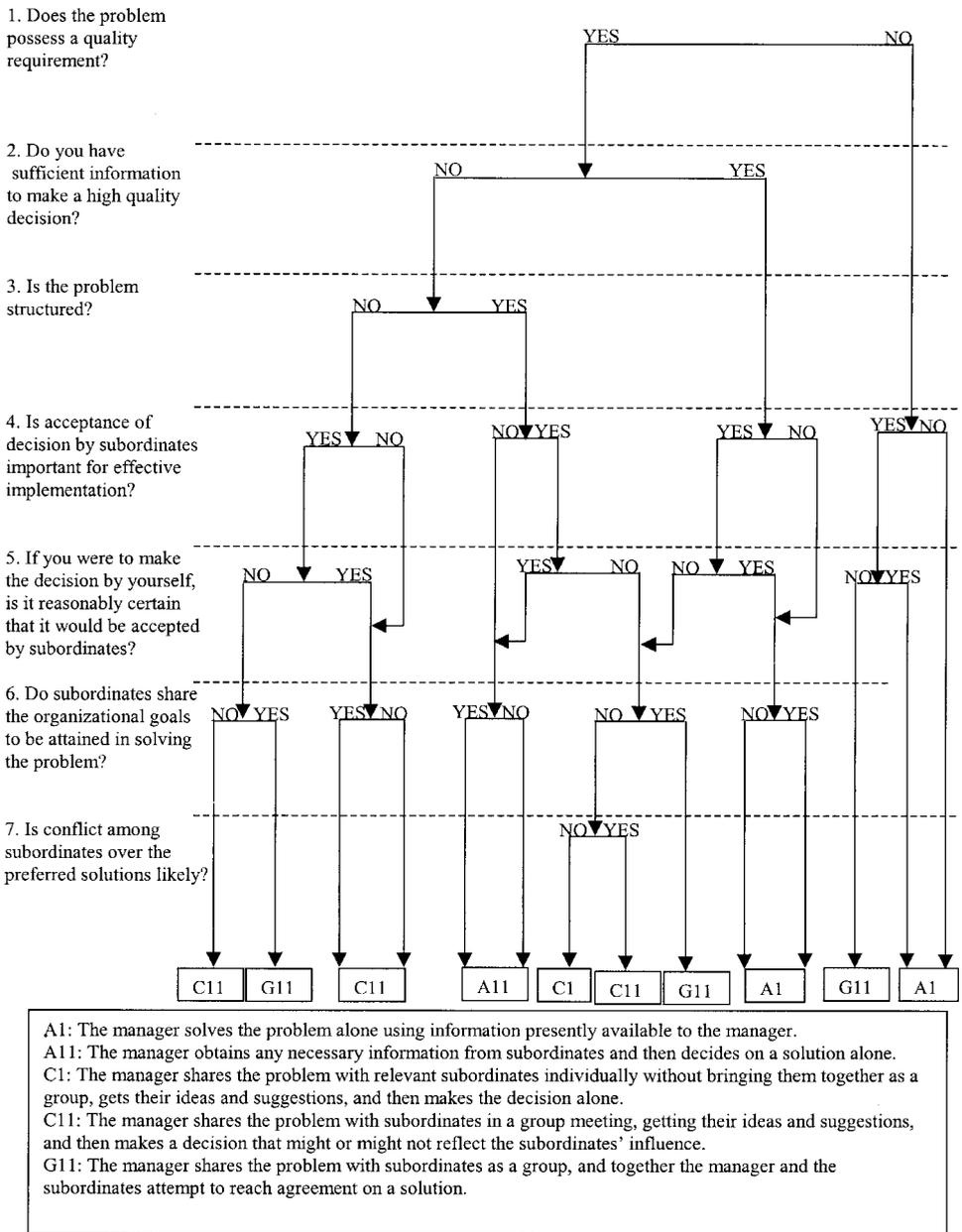


FIGURE 1 Original model adapted from Vroom and Yetton (1973).

1988). Approaches that conformed to the model were evaluated as successful 62% of the time, while those that failed to conform were successful only 37% of the time.

The utility of the Vroom–Yetton model for public participation in general (Thomas 1995), and in natural resource decision making in specific (Sample 1993; Daniels et al. 1996), has been documented. However, in these analyses, the model has been modified only slightly, with certain questions changed so that they refer to the

parties and decisions faced in public arenas. The Vroom–Yetton model was developed based on criteria applicable to decision making in general. These criteria relate to (1) quality of decisions, (2) commitment to decisions, (3) development of human capital, (4) time, and (5) worker satisfaction. In developing the Vroom–Yetton model, however, these criteria were analyzed based on previous research related to management–employee interactions in the business arena. In previous applications to the public arena, no attempt has been made to determine the applicability of these criteria to the public setting.

Application of Model Criteria to Public Participation

In the private sector, the shareholders theoretically pass their “vision” on to their elected board of directors. The board of directors passes vision and authority for action on to the managers. The Vroom–Yetton model focuses on the manager–subordinate decision-making relationship. The term “manager” includes branch and division heads, middle management, and line managers. To implement the company’s goals, the manager passes an interpretation of policies and the authority for implementation down to the subordinates. Subordinates ultimately make the vision reality through making and marketing the product. Subordinates or employee numbers are finite and controlled by the managers. “Subordinates” are under the “control” of managers who have the ability to hire or fire, promote or demote.

The structure in the public sector is substantially different, although some parallels might be drawn. In the public sector, the body politic articulates a vision to its elected representatives. The elected representatives develop goals for meeting the “public interest” and pass authority to the agency or administrative unit. The unit of comparison with the business sector’s manager–subordinate relationship is the agency–publics relationship. The agency passes on—to the affected publics—an interpretation of policies, a request for compliance with regulations, and, in some situations, a request for assistance with fine-tuning in order to implement the policies. The publics concerned with natural resource management, however, are many and varied. Unlike the business setting, the number of publics involved in a given issue is outside the control of the manager, the publics can hold multiple roles, and managers have no power to fire or demote the publics. Additionally, if the affected publics believe that the administration of regulations and policies is unfair or unjust, they can turn to the power of lobbying and the judicial system in order to influence elected representatives to change the policies or laws. These important differences require an examination of the applicability of the Vroom–Yetton model in the public natural resource setting, not just an adaptation that changes the names of the players.

With these principles in mind, we have reexamined the Vroom–Yetton model as it applies to public natural resource decision making to determine (1) whether the model as formulated is properly suited to this purpose and (2) whether the model can be improved for this application. We used the same decision-making criteria from the original Vroom–Yetton model and, as was done with the original model, we studied each of the model criteria based on previous research applicable to the decision-making arena, in our case natural resource decision making. We then compared these findings with the findings used from the business arena for original model development (Vroom and Jago 1988) to determine whether differences necessitated changes in the model. We now present each of the original criteria,

comparable analyses in the natural resource public arena, and resulting recommended revisions to the model.

Quality of Decisions

For this model's purpose, a high-quality decision is defined as "a well reasoned decision, consistent with available information and with organizational objectives and goals" (Vroom and Jago 1988). Conditions that influence whether enhanced participation will benefit or detract from decision quality include (Vroom and Jago 1988):

1. *Goals.* Problems for participative systems are presented by the focus on personal goals to the detriment of organizational goals. In contrast, the development of superordinate goals and a synergistic climate contribute to problem solving.
2. *Knowledge possessed by participants.* Participation can bring more extensive information resources and a larger variety of perspectives to bear on the decision-making process. It is also important to develop a mechanism for sorting out good ideas from those destined to fail.
3. *Size of group.* The tendency is for smaller groups to lack needed informational sources and for larger groups to suffer from problems of coordination.
4. *Disagreement among participants.* Dialogue between participants develops different points of view, and the ability to choose between different judgments has the potential to strengthen the decision-making process. However, unmanaged conflict can be detrimental to decision quality.
5. *Nature of the problem.* Certain tasks are improved by group processes; others are slowed or hindered. In certain cases, groups might be useful for conceptualizing an approach to a problem but not in executing the solution.

Three questions in the Vroom–Yetton model relate to quality of decisions. In the Vroom–Yetton model, decision quality refers to the analytical, objective, or impersonal aspects of the decision, which implies the existence of a set of criteria by which results can be judged objectively. In certain cases, however, the quality of the decision might be irrelevant. This leads to the first question in the original model as to whether a quality requirement exists (Figure 1). In addition, since a high-quality decision is dependent on adequate information, Question 2 inquires as to the adequacy of information. Similarly, Question 3 examines whether the problem is well structured relative to alternative solutions.

The challenge of defining "public" goals and objectives in a highly pluralistic society is more complex than defining business organizational goals and objectives. Natural resource decisions have, as a core component, conflict among the interests of various groups of stakeholders (Lang 1990; Daniels et al. 1996). Thus, in the public arena a quality requirement has been deemed to always be present, and alternative language for Question 1, "What are the quality requirements?," was proposed (Thomas 1993). We have eliminated this question because selection of participation methods does not depend on it, and it therefore does not serve any purpose. Paths in the Vroom–Yetton decision tree that related to situations without quality requirements have been eliminated.

The same benefits of increased participation for decision quality in the private sector appear applicable in the public sector: the potential for increased synergy as more stakeholders are involved, the ability to bring greater resources to bear on the problem, and the generation of more alternatives. Additionally, the local knowledge

of stakeholders can inform the decision-making process (Forest Ecosystem Management Assessment Team 1993). Thus, one of the two main goals of public participation is to achieve “objectively better” decisions by meeting resource management goals by improved exchange of knowledge and definition of issues (Lawrence and Daniels 1996). Questions 2 and 3 of the original model (Figure 1), therefore, are equally applicable to the public natural resource arena and have been incorporated in a revised model as Questions 1 and 2 (Figure 2), modified only to reflect that someone other than the manager might be making the judgment (Thomas 1993).

Commitment to Decisions

By creating opportunities for subordinates to influence decisions, a manager frequently reduces resistance and secures a shared feeling of ownership over decisions that results in smoother, more expeditious implementation (Vroom and Jago 1988). Questions 4 and 5 in the original model (Figure 1) relate to commitment by inquiring as to whether acceptance is important for implementation and the impact of autonomous decision making on acceptance.

Public participation can also affect commitment to decisions (Lind and Tyler 1988; Lawrence et al. 1997). There are many instances where natural resource managers have made what appeared to be a sound “technical” decision that proved unacceptable because the process was not acceptable. The USDA Forest Service’s experience during forest planning efforts in the late 1980s illustrates the importance of reconciling science and politics. The Forest Service’s traditional procedure of information gathering and “subsequent *internal* analysis proved to be a failure. . . . Virtually every forest plan in the country was appealed” (Manring 1993, emphasis added). In the absence of participative decision making, publics have turned to social systems (e.g., organized user groups) and political systems (e.g., new laws, expanded role of the courts) to make their needs known (Koch and Kennedy 1991). The highest ranking issue facing forest supervisors and district rangers in a Delphi survey in 1990 was legal and political challenges to decisions (Jakes et al. 1990).

An alternate goal of public participation in natural resource decision making is to reach decisions that have increased public support, or are “subjectively better” decisions (Lawrence and Daniels 1996). Public participation has a legitimizing effect and the potential to produce a higher level of commitment to the resulting decisions. Increased satisfaction, support, and acceptance might occur because the public believes managers better understand the public’s wishes and that managers have used information gathered from the public to make better decisions, or that the procedures are fair.

Significant differences between the private and public sectors, however, affect application of this criterion. These differences include the complexity of human systems in the public sector and the need to include values and emotions in decision making. Vroom and Yetton’s criteria are dependent on the existence of a defined problem. The limitations of past “technical” approaches to problems in the public arena, however, are due, in part, to the pluralistic and dynamic nature of both government and the body politic (Kirlin 1996). The approach to improving human systems is more complex than “solving” a single “problem” or a set of problems. For natural resource management, it is important to move from a “problem–solution” approach to a “situation improvement” approach (Daniels and Walker 1996). A problem is just one type of situation and a solution is just one means of improvement.

in particular cases. This descriptive meaning is properly found through *reasoned discourse* which attempts to relate the anticipated effects of a policy to community values and to test that relation by formal principles” (Flathman 1966, 82, emphasis added).

Notwithstanding these differences in the public arena, the original form of the questions related to commitment to decisions appear equally applicable to the public arena. Thus, the questions have been incorporated in the revised model as Questions 3 and 4, with the substitution of the public for subordinates (Figure 2).

Development of Human Capital

An important supplemental advantage of participation might be the development of certain skills and relationships among the participants that yield benefits beyond the improvement of decision quality. This “human capital” of the organization can be increased through participation activities by (1) enhancing decision-making skills and increasing the reservoir of internal talents upon which the organization can draw; (2) building teams by providing opportunities for participants to relate with one another, work through common problems, and learn to trust and rely on one another; (3) developing organization loyalty by integrating individual goals with those of the organization; and (4) promoting self-reliant skills, which result in less need for extensive staff support within the organization (Vroom and Jago 1988). Along with previous questions, Question 6 of the original model addresses these issues by inquiring whether organizational goals are shared, while Question 7 inquires as to the possibility of conflict among subordinates.

Development of human capital might be substantially more important in the public sector than in the business sector. Public deliberation encourages individuals to transcend their own narrow self-interests and to develop civic loyalty (Reich 1985; McGuire et al. 1994; Ozawa and Podziba 1997). Social learning, communication, and conflict management skills—within and between agencies and stakeholders—are of special importance in communities where stakeholders and decision makers will remain in face-to-face contact with each other after the decision is made (Kwartler 1980; Reich 1985).

Even though the need to develop human capital is present in both the business and the public natural resource settings, there are important differences in how this criterion is applied to the models. The impacts of two topics studied for the original model that related to human development are very different for public natural resource decision making: (a) the effect of common and divergent goals and (b) the effects of conflict.

Common and Divergent Goals

Thomas (1990) reworded Question 6 for the public arena to ask: “Does the relevant public share the agency goals to be obtained in solving the problem?” The wording does not provide for the complex assemblage of “publics,” often holding differing and seemingly conflicting goals, that surrounds many natural resource issues. The Thomas models (1990; 1993) specify group or collaborative processes *only* if the public shares the agency’s goals; otherwise, a consultative decision is recommended. This wording (1) implies that the publics are to engage in a dialogue in response to the agency’s perception and definition of the problem, (2) does not allow the agency to develop joint goals with the publics or to develop agreed-upon actions that still

improve the situation to the benefit of the resource, even if goals cannot be agreed upon, and (3) implies that all participants have well-defined goals prior to participation, which is often not the case.

In the public setting, dialogue is important for learning, and there is often the need to bring the public together face to face (Shannon 1987; Friedmann 1987). Such dialogue enables social learning and validates decisions (Tjosvold et al. 1986; Forester 1989; Torgerson 1990; Roberts 1997), is necessary for identifying and ordering values (Fischer 1980), and plays a critical role in setting resource management goals (Henning and Mangun 1989; Lawrence and Daniels 1996).

It is not sufficient, however, to begin an unstructured discussion about values because core values can be uncompromisable (Barbour 1980). Rather, dialogue can be structured to enable decision making without compromising basic values (Wilson and Morren 1990). A collaborative learning process enables the development of mutual social goals while trade-offs are made as players learn about the values of the others involved (Daniels and Walker 1993). The development of superordinate goals and integrative approaches has the potential to produce the highest joint outcomes (Pruitt and Rubin 1986).

These findings indicate the need for expanding the Vroom–Yetton/Thomas model to (1) enable social learning to occur between the agency and the public, and among the “publics,” and (2) reflect the importance of dialogue, of structuring dialogue to enable decision making without compromising basic values, and of utilizing integrative approaches in order to define the “public interest.” Thus, we propose the following alternate wording, which is incorporated as Question 5 in our revised model (Figure 2): Are the relevant publics willing to engage in an integrative dialogue in order to improve the situation?

Effects of Conflict

Vroom and Jago (1988) viewed conflict as a sign that people should interact more (rather than less) frequently in an attempt to resolve their differences. Vroom and Jago (1988) identified a necessary prerequisite to this interaction: “The subordinates must share a common goal that is organizationally relevant” (p. 127). Frequently, at a practical level a common “organizational goal” is absent in the public setting. Thus, we must determine when it is useful to bring the public *together* versus consulting *separately* with segments of the public.

If the necessary integration cannot occur, the benefits of learning, listening, and discussing are still valuable for the next step of public deliberation. Those benefits are useful to begin the process of developing an understanding of others’ interests, and of breaking down barriers due to mistrust. Stakeholders and decision makers will probably need to work together again in the future, and learning about each other’s interests is a useful first step toward improving the situation (Kirlin 1996). Bringing the publics together can improve communication through conciliation, sharing information, clarifying issues, or generating alternatives (Reich 1985; Bingham 1986). In addition, procedures that allow participants to express their views achieve greater acceptance of, and higher levels of compliance with, decisions, as well as increased confidence in decision makers, “*even where the decision maker has little or no decision space*” (Lawrence et al. 1997, 583, emphasis added).

Assembling the publics together too rapidly, however, even for consultative purposes, when high distrust levels exist can be counterproductive. Often, conflicts are entrenched, progress is exceedingly slow, and damage can be done without the

proper process. Before putting heavily entrenched publics together, it is important to determine if relational progress can be made. It might be necessary to do some remedial relational work before the public is brought together (Bingham 1986; Dembart and Kwartler 1980).

In situations where the alternative solutions have been defined (i.e., there is no decision space) and are strongly opposed by the majority of stakeholders, it probably would not be useful to bring the parties together during consultation. Such a situation can exacerbate the “frustration effect” where the impact of negative outcomes is strengthened by “social support for the perception that the outcome is unfair” (Lind and Tyler 1988, 183).

In light of this, we propose the following alternate wording for Question 7 (Question 6 in the revised model, Figure 2): Would the quality of public input or future relations be improved if learning occurs among the “publics” about the situation’s issues? Additionally, the decision tree structure must be changed to incorporate two new responses indicated by the public participation literature. A “yes” answer would indicate consulting with the publics in unison; a “no” response would indicate consulting individually with segments of the public.

Time

Participation requires an increase in the response time of decision-making systems and the individual employee’s decision developing and decision-making time. Trade-offs between staff development and lost time should be weighed.

Time is a more complex criterion in the public sector. The adage “Time is money” has a different meaning in the public sector because there is no clear competitor having the market advantage due to lost time. In the public sector, it is understood that a collective decision regarding public goods will take time. However, the passage of time creates negative impacts such as increased social and economic costs for displaced workers, further compromise of endangered species habitat, increased costs for staffing participative processes, and increased expenditure of time by involved publics.

Vroom and Jago (1988) focus on the negative aspects of time lost to “process” in the short term. In the public sector, it is important to attempt to determine which issues require an investment of time at the outset in order to save time lost to court battles and other challenges at a later date (Thomas 1995). Indeed, it might take substantial time for the public and resource managers to grasp all of the choice ramifications of an issue and to accept them (Yankelovich 1991).

In the Vroom–Yetton model, the time criterion is reflected not in the questions, but in the choice of alternative participation methods. Thus, a time-efficient model was proposed that recommended the most time-efficient of acceptable participation methods for each path through the decision tree. Although less time-efficient approaches might yield advantages in the public arena, all applications to public participation to date have applied the time-efficient model. Therefore, we have also chosen this model for our analysis.

Worker Satisfaction

The effect of participation on job satisfaction influences people’s decisions about whether to remain in jobs. For example, turnover rates and absenteeism rates are linked to job satisfaction. However, there is little evidence that job satisfaction has a

direct effect on raising productivity or efficiency. Because there was such a weak connection between satisfaction and performance, Vroom and Jago did not utilize that criterion further.

Participant satisfaction is not readily ignored in the public arena. Satisfaction with decision making can influence such factors as acceptance of decisions, compliance with decisions, and relations with decision makers (Lawrence et al. 1997). The most important impact on satisfaction appears to be the opportunity to be heard. These factors are addressed in the revised model by Question 4, which inquires as to public reaction if participation is not provided, and Question 6, which inquires as to the impact on future relations.

Additional Similarities and Differences Between Business and Public Sectors

In the business world, the market acts as an immediate feedback mechanism indicating when “products” are no longer desired or need to be changed. Natural resource managers have less immediate feedback. Years ago, the public predominantly wanted fiber from forests. Now the public desires a multitude of products in addition to fiber: recreation, clean water, wildlife habitat, and wilderness. These four examples of public desires, however, are largely nonmarket goods, which tend to be undervalued in a market-driven economy (Stankey et al. 1992; Koch and Kennedy 1991). Public participation serves as a communication device, acting as an approximation for the market feedback mechanism—informing elected officials and natural resource managers of changing values.

One major difference, in addition to the complexity of the publics in the public sector, is that the numbers of publics change with the issues independently of the direction of the management. The power of special interest groups is felt much more heavily in the public sector because of the pluralistic nature of our government. The power between special interest groups varies, and some might even have more power than agency administrators or governmental leaders (Potapchuk 1991).

Limitations on Application of the Model

Although the revised model can be useful in guiding natural resource managers in their public participation endeavors, such models have important limitations and should not be followed mechanistically. Often the questions can be answered in either way, depending on the user’s perspective. Thus, as has been noted elsewhere (Daniels et al. 1996), the model might be most valuable for a manager who has no preconceived notion or mandate of how to involve the public. In such cases, the process of stepping through the decision tree can assist in illuminating the important factors that can influence the choice of participation mechanisms.

The model is also based on time efficiency. This means that the choice of participation method is the one that achieves the decision-making criteria in the most time-efficient manner. In any particular case, other factors specific to the decision and not contemplated by this generalized tool might dictate a less time-efficient method with a greater degree of public participation. Again, the model should be used as a *guide*, not as a mandate.

Application of the Natural Resource Adapted Model

The revised model can be used in various contexts. Forest managers, for example, face a large number of routine day-to-day decisions. It is often difficult to determine which

of these decisions would benefit from involving the public and, if so, which approach is most appropriate. An example is provided from the Oregon State University's McDonald–Dunn Research Forest (the Forest), where one of the authors served as the Recreation and Education Manager during the period of research for this article. In more complex or controversial situations, public participation approaches might often be dictated by legal requirements or political realities. Use of the model in these settings might still be useful for identifying participation issues or guiding participation structure. An example of this more complex setting is provided by the Montana Department of Livestock (MDOL) bison policy.

Example 1

The 14,000-acre McDonald–Dunn Research Forest includes lands acquired since the 1920s to serve as an outdoor laboratory for Oregon State University's College of Forestry classes and research. In the current administrative structure, the forest director, administrative committee, or dean, depending on the level of significance and impact of the decision, makes major decisions. Eight full-time program managers in resource areas such as recreation/education, silviculture, and wildlife biology conduct day-to-day management activities.

In our example from this forest, the decadal harvest plan identified a unit for development of a two-storied stand. The stand was adjacent to a county road used by residents to access a valley north of the forest and a heavily used recreation route. The stand was identified as visually significant in the McDonald–Dunn Forest Plan, adopted in 1993 (the Forest Plan). A clear-cut on an adjacent stand occurred 8 years before and residents remained upset about the communication surrounding, the decision-making process involving, and the visual impacts resulting from that clearcut.

Question 1. Does the manager have sufficient information to make a high-quality decision? “No,” the manager does not know the visual preferences of the community in relation to this stand.

Question 2. Is the problem structured such that alternative solutions are not available for redefinition? “Yes,” the Forest Plan specifies where the harvest will take place and that it will be a two-storied harvest.

Question 3. Is public acceptance of the decision critical to effective implementation? “Yes,” the visual concerns along this roadway in particular, and of the forest in general, are of documented concern to the community. The affected public would probably translate opposition to the project into political opposition, or the Forest Plan possibly could be challenged. Political opposition would result in delays to implementation of the harvest plan.

Question 4. If public acceptance is necessary, is it reasonably certain if the manager decides alone? “No,” because this is in such a visually prominent location, and because the trust levels are not high between the community and the forest, the community would probably not defer judgment to forest managers.

Question 5. Would the quality of the input or future relations be improved if learning occurs among the “publics” about the situation's issues? “No,” the quality of the input could be improved if adjacent neighbors and commuters on the county road realize they have common concerns and begin developing consensus about priority visual areas. The forest staff, however, could probably identify these points

of consensus after speaking with the publics separately. There are no significant relational distances between the publics that would benefit from the publics learning about each other.

The model specifies C1, which is consultation with segments of the public separately. However, if (1) the staff is having problems identifying points of consensus, (2) the publics accept the forest's constraints, and (3) consensus would develop from assembling the publics, then C11 would be appropriate, which is consultation with the public as a single assembled group. The lack of adequate knowledge about community preferences and the need for community acceptance effectively preclude autonomous decision making. The lack of alternatives in the Forest Plan precludes group decision making.

Use of the original model would suggest the same result, but for different reasons. With the original model, group decision making is precluded because the community might have different goals than the forest managers, and the public is not segmented for consultation because conflict among publics is not seen as likely.

Example 2

The MDOL bison policy is one of the most controversial issues currently facing the Greater Yellowstone Ecosystem. Many of the Yellowstone National Park (YNP) bison are infected with *Brucella abortus*, the cause of the disease brucellosis, which can cause cattle to abort and is known as undulant fever in humans (Keiter 1997). Concern that bison might spread the disease to Montana cattle has prompted the state to vest the MDOL with authority over bison entering Montana from YNP. Under an Interim Bison Management Plan, the MDOL (1) tries to haze bison back into YNP, (2) if hazing is unsuccessful, captures the bison and tests them for brucellosis, (3) slaughters bison that test positive or are deemed high risk, and (4) releases on public land bison that test negative and are not high risk (Bridges 2000). Ongoing litigation and interagency efforts with federal and other state agencies might dictate the manner of public participation, if any. Use of the model might, however, guide the MDOL as to where participation issues are present.

Question 1. Does the manager have sufficient information to make a high quality decision? “No,” there is substantial uncertainty as to the risk of spread of brucellosis from bison to cattle (Keiter 1997) and the impacts of policies relative to balancing the region's reliance on livestock and tourism (Rasker et al. 1992).

Question 2. Is the problem structured such that alternative solutions are not available for redefinition? “No,” legally a wide variety of options is open to the MDOL.

Question 3. Is public acceptance of the decision critical to effective implementation? “Yes,” current public opposition has resulted in substantial obstacles and increased costs for implementation. In addition, further litigation can be expected if public acceptance is not achieved.

Question 4. If public acceptance is necessary, is it reasonably certain if the manager decides alone? “No,” the current policy has failed to achieve consistent public acceptance. An alternative policy that allows exposure of cattle to free-ranging bison is unlikely to be accepted by the livestock industry.

Question 5. Are the relevant publics willing to engage in an integrative dialogue in order to improve the situation? This is the most difficult question for the MDOL to answer and determines whether group or consultative approaches are appropriate.

The current highly polarized nature of the dispute indicates that, for the most part, it is unlikely that the environmental community and the stockgrowers are willing to seek a collaborative solution. Until more development takes place among the publics, therefore, this question is answered “*No.*”

Question 6. Would the quality of public input or future relations be improved if learning occurs among the publics about the situation’s issues? This question determines whether consultation with the public takes place as a single group or within segments. While the current polarization might frustrate attempts to achieve better relations, there is a potential for improved input or relations if opposing publics achieve a better understanding of each other’s concerns and positions. This question is therefore answered “*Yes.*”

The model specifies C11, which is consultation with the public as a single group. However, if the quality of input or relations does not improve, the MDOL should shift to C1, consultation with segments of the public separately. Similarly, if consulting with the assembled publics results in a willingness to engage in an integrative dialogue, the MDOL should shift to G11, where the MDOL and the publics attempt to achieve a solution together. In any event, the need for improved information and public acceptance should preclude the MDOL from making any autonomous decisions.

The original model leads directly to C11 since there is a diversity of goals among the MDOL and the publics. Regardless of the publics’ willingness to enter into an integrative dialogue or the ability to improve input or relations, or alternatively the level of polarization present, the same result is reached. This is too narrow a result in the public natural resource context, where either (1) the potential from improved decisions and long-term relations can be achieved by bringing managers and publics together for group decision making or (2) existing hostility might make single-group consultation counterproductive. The revised model is therefore more appropriate because it provides for these possibilities in the future.

Even if the form of public participation is dictated to the MDOL by law or politics, use of this model has been helpful. The model demonstrated that, because of the current atmosphere surrounding bison policy, neither group decision making nor segmented consultation is optimal. The progress of public participation, however, should be monitored to determine when alternative approaches might be desirable.

Conclusion

For public participation in natural resource decision making to reach its full potential, we must accept that there is no single approach that will work for all situations. Rather, resource managers need to be adaptable, using the public’s knowledge and input when possible and exercising management discretion when appropriate. With a multitude of participation options available, a tool that will help guide managers is needed, and the Vroom–Yetton model is the most practical available. Using a version of this model that expressly considers the distinctive nature of natural resource decisions will improve method selection.

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