NATURAL RESOURCES JOURNAL

Volume 16
Issue 1 *Symposium on Public Participation in Resource Descionmaking*

Winter 1976

Analyzing Public Input to Resource Decisions: Criteria, Principles and Case Examples of the Codinvolve System

Roger N. Clark

George H. Stankey

ANALYZING PUBLIC INPUT TO RESOURCE DECISIONS: CRITERIA, PRINCIPLES AND CASE EXAMPLES OF THE CODINVOLVE SYSTEM

ROGER N. CLARK* and GEORGE H. STANKEY**

One of the most significant changes in resource management in North America in the past decade has been the increasing importance of citizen participation in the decisionmaking process. Laws, agency directives, citizen pressure, and resource administrators' desire to do a better job have produced a variety of programs designed to promote and facilitate citizen involvement in decisionmaking. But in the course of these efforts, many problems surfaced which involve both philosophy and technology. Questions arose regarding such things as how to get public input, what to do with it, how to use it relative to other kinds of information, and so forth, questions which often confounded the effective use of public input. Unfortunately, citizen groups often saw these difficulties as evidence of an entrenched, resistant bureaucracy unwilling to open its decisionmaking process to public participation.

The U.S. Forest Service was among the resource management agencies which developed a variety of programs to promote public involvement. The agency has broad land management responsibilities, and citizens have expressed increasing concern about its allocation and management priorities. Citizens have been contesting agency actions, often in court, on such topics as wilderness classification and timber harvesting methods.

In 1972 the Forest Service initiated an administrative study to review the agency's public involvement efforts.[1] The objectives of this study were: (1) To review public involvement procedures to determine which work best under what conditions, and (2) to develop new techniques for analyzing public input. It soon became apparent that the study team needed a conceptual framework identifying processes basic to any public involvement effort. Conceptualizing the system also helped isolate the discrete processes of public

---

*Research Social Scientist, Pacific Northwest Forest and Range Experiment Station, USDA Forest Service, Seattle, Wash.

**Research Social Scientist, Intermountain Forest and Range Experiment Station, USDA Forest Service, Missoula, Mont.

1. J. Hendee, R. Lucas, *et al.*, Public Involvement and the Forest Service: Experience, Effectiveness and Suggested Direction (U.S. Forest Service, 1973).

involvement, so that a more useful assessment of the strengths and weaknesses of public involvement programs could be made.

Five main processes comprise the framework we have used.[2] Initially, the *issue definition* process outlines the legal, administrative, and environmental constraints within which managers must operate. The range of viable alternatives is determined at this time. Second, the *collection* process involves all the various techniques by which input is solicited from citizens. Third, the *analysis* process summarizes and displays the nature, content, and extent of input received. Analysis is objective, delivering information from citizen to decisionmaker without any judgment as to its value or worth. The fourth process is *evaluation,* in which input is interpreted and weighed by decisionmakers. Unlike analysis, evaluation is subjective. Finally, the *decision-implementation* process involves feedback to the public, providing time and opportunity for citizens to review a pending decision, and the actual steps required to translate a decision into a program of action.

Although these five processes are distinct components, they also are highly interdependent. The way in which any one is conducted can dramatically affect the others. For example, the ability of decisionmakers to evaluate data obtained will be greatly affected by the way issues are defined, the collection techniques used to tap public sentiment, and the analysis system used to describe and array public input. Similarly, successful implementation of decisions into programs which win public understanding and support will largely depend on the decisionmaker's ability to explain how all factors are considered. Like the proverbial chain at its weakest link, the interdependence of the decisionmaking processes makes it mandatory that each be planned in light of its relationship to each of the other processes.

In reviewing Forest Service public involvement efforts, it became evident that analysis of public input presented the most serious obstacle, a conclusion which was reinforced by the number of requests we received from land managers seeking social scientists' assistance in handling the flood of input from citizens. In many cases, thousands of responses were received. The volume of input, coupled with the complexity of many issues, made it virtually impossible to make effective use of the information. Thus, the development of a systematic, objective, and reliable system which could be uniformly applied for analyzing public input held high priority. This

2. *See* Hendee, Clark, & Stankey, *A Framework for Agency Use of Public Input in Resource Decision Making,* J. of Soil and Water Cons. 60-66 (1974).

paper describes the development, application, and problems associated with such a tool.

DEVELOPMENT OF THE CODINVOLVE SYSTEM

From the broad, generic methodology of content analysis, we developed an applied content analysis system we call Codinvolve.[3] The system is founded upon a set of principles and criteria geared to yield an accurate, replicable summary of public input. It is designed to use edge-punch, card sorting techniques which are workable at field levels where computer assistance usually is not available, though it is also readily adaptable for computer use.

The basic concept underlying systematic content analysis of public input is as follows. The common denominators of virtually all public input are the opinions offered *for, against,* or *about* the issues in question, along with any *reasons* given to support the views. The number and kinds of reasons can vary considerably, even among those given to support the same opinion. This combination of opinions and supporting reasons defines the *values* the public holds with regard to the issue in question.

In considering the analysis process, we have developed six broad principles that any analysis system should meet:

1. *Analysis is separate from evaluation.* Analysis is an objective, replicable process; evaluation is subjective. The importance of input is judged only during evaluation. Analysis simply provides a record of the input, a record as accurate and undiluted as is possible.

2. *Decisionmaking questions guide analysis.* To make analysis most effective it is necessary to specify in advance those questions about public input that decisionmakers want answered. Often, however, public involvement programs are initiated with little forethought about specific questions administrators need answered. This severely limits the analyst's ability to provide data describing public input in a form which the decisionmaker will find useful.

3. *All input is relevant and must be processed.* Because all input expresses human values pertinent to the natural resources, all of it has implications for decisionmakers. Emotional statements as well as detailed, site- or issue-specific remarks hold potential meaning for decisionmakers, and the analyst must make sure his summaries incorporate all information.

4. *Analysis must be systematic, objective, visible and traceable.* Analysis should follow a structured procedure to check and balance

3. R. Clark, G. Stankey and J. Hendee, An Introduction to Codinvolve (U.S. Dep't of Agriculture, PNW-223, 1974).

the way input is handled. It must be objective so that independent review would generate the same information. It should be visible so the public can see that citizen opinion plays a significant role as resource decisions are made. Finally, traceability assures that an independent reviewer can "follow" how input was handled.

5. *Identity of the input must be maintained.* During analysis there should be no combining or altering of input. Decisionmakers later may wish to review how opinion varied according to the forms in which it was expressed, the locations where it originated, etc. Input from personal letters, for instance, should not be combined with input from form letters or petitions. The content of each type of input must be summarized separately so each can be reviewed for its particular implications.

6. *Analysis must be a continuing process.* Because many resource management decisions evolve over extended periods of time, the analysis system must be capable of storing, retrieving, and summarizing information as it is needed.

From these broad principles, we have formulated 10 specific criteria for analyzing public input:

i) The method should summarize the extent, content and nature of public input in relation to the decisionmakers' questions.

ii) It must be objective.

iii) It must be visible and traceable.

iv) It must be reliable, in that the opinions expressed are recorded the same way by different analysts.

v) It should provide for uniform application among different administrative units.

vi) It should be flexible, to accommodate different conditions.

vii) It should have the capacity to handle large quantities of input, to store and retrieve input, and to assimilate continuing input.

viii) It should summarize the balance of opinions expressed and describe variations in each opinion.

ix) It should provide other descriptive and qualitative information about the content and nature of input.

x) It should facilitate environmental analysis leading to preparation of final environmental impact statements by identifying all significant information and arguments for and against the proposed actions.

BASIC STEPS IN USING CODINVOLVE

Codinvolve provides for orderly and systematic transfer of information from any type of written input to a form that is easy to

summarize for review. With input in hand, the analyst must provide a summary which answers the decisionmakers' questions and objectively describes the full content of that input. The steps in doing this job are described briefly.[4]

1. *Identify questions for which decisionmakers need answers.* It is essential that the analyst know in advance what information the decisionmaker wants from the public input. (Usually this information should be determined early in the public involvement process.) This is the key to useful analysis. The analyst must consult decisionmakers to insure that nothing important is overlooked and that summaries are provided in a useful fashion. Basic questions often asked by decisionmakers include: Who said what, what was the distribution of sentiment on the issue and how did it vary, where did the input originate.

2. *Survey the input to determine the breadth of issues it discusses.* This step provides an overview of input—the issues it discusses and the information it provides. Although it is important to specify decisionmaking questions, it is critical that the analytic structure not filter out any new or unanticipated information. In order to respond to the varying nature of input and maintain its integrity, analysis must capture the full breadth of public input so as to summarize it for review.

In order to determine the breadth of issues the input contains, a sample is taken and its content summarized. This content summary is used to define the range and diversity of opinions, supporting reasons, and factual material contained in the input.

3. *Design summary form and codebook.* The two basic documents for a Codinvolve analysis, the summary form and codebook, are built around results of the previous step, i.e., the system is designed to incorporate the full range of opinions and ideas expressed in the input.

It is on the *summary form* that information from the input is recorded. Edge-punch cards have been the basic tool used for this purpose in most Codinvolve applications. Information from the input can either be coded in punches along the edge of the card or written out in detail directly on the card.

The *codebook* tells the coder how to use the summary form. It contains detailed procedural instructions, definitions, and examples which show where and how information should be coded. It is a basic reference document, and any changes in coding procedures

4. For a complete description, *see* R. Clark, G. Stankey, et al., The Codinvolve Users' Manual. Available on request from Recreation Research Project, 4507 University Way N.E., Seattle, Wash., 93105.

must be noted in it. Reliability, the assurance that each coder's work will replicate that of other coders, is crucial to the system's success. In order to insure accuracy, the set of instructions from which all coders work must be clearly understandable and uniform.

4. *Code input.* Coding is the process of transferring the content of public input to a form that facilitates summary. The major objective in coding is to capture, accurately and objectively, the complete scope of information. The principal obligation of the coder is to record only what the citizen said, not what the coder thinks he means. Coding is a process that must be entirely objective and replicable. This is possible with careful attention to coding procedures, training of coders, and regular checks for accuracy.

Coding is a demanding job; not everyone can do it. Persons who do not rapidly acquire the necessary skill should not continue coding. Ideal coders, from the standpoints of both accuracy and cost, usually are technical or clerical personnel. Personal or professional knowledge about the issue at hand is not necessary and, in some cases, can actually interfere with accurate coding.

Experience indicates that it takes at least three or four days to train a group of coders. During this period, accuracy usually starts at 50 to 65 percent and rises to 90 percent or higher.

The amount of input that a coder can handle without a significant decline in accuracy varies with individuals and differing types of input. For fairly complex letters, average output per coder usually falls between 30 and 50 inputs a day. Beyond that number, accuracy begins a sharp decline. Structured types of input are easier to code, so form letters and coupons can be handled more quickly, sometimes as many as 150 to 200 a day.

5. *Organize a report summarizing the input in relation to pertinent questions (a judgment-free summary).* Upon completion of coding, the analyst summarizes the information into a format easy for decisionmakers to use. The process of constructing tables displaying information is done either by hand using edge-punch cards, by computer, or both. (See the discussion later in this paper concerning the relative advantages and disadvantages of these approaches.)

The end product of Codinvolve is a set of tables which summarizes public input. It is particularly important that the analyst provide information about all issues citizens have discussed on their input and not just that related to the specific questions on which information is sought. This will ensure that new or unanticipated information is not overlooked.

The product of a Codinvolve analysis is not a written report. It is the objectively interpreted display of public input, such as shown in

Table 1.[5] However, most decisionmakers will request that analysts provide more than a collection of tables. For example, they will be interested in what interpretations the analysts make of these tables, what limitations the decisionmaker should consider, and so forth. Writing such reports requires that an analyst interpret the tables with caution to assure that his narrative accurately describes the data. To guard against subjective or erroneous interpretations, we have recommended that drafts of the reports be circulated to others for technical review. This review process is invaluable in keeping interpretation accurate and in incorporating points the author might have missed.

TABLE 1

A Hypothetical Example Showing Balance of Opinion According to Form of Input with Supporting Reasons

Resource management alternative[1]	*Form of input*				
	Letters[1]	*Petitions*	*Reports*[1]	*Form Letters*	*Total*
For	82 (I) 90 (S)	2 (I) 83 (S)	3 (I) 3 (S)	82 (I) 86 (S)	169 (I) 262 (S)
Against	31 (I) 35 (S)	18 (I) 645 (S)	4 (I) 5 (S)	21 (I) 21 (S)	74 (I) 706 (S)

(I) = Number of inputs. (S) = Number of signatures.

1. A list of organizations submitting letters and reports is provided for every opinion discussed.

Reasons given in support of the opinion expressed:

Reasons for:	Reasons against:
Best for economy (151)	Already too many roads (72)
Provide jobs (111)	Need more wilderness (65)
Provide mass recreation (61)	Preserve for posterity (47)
Other alternatives too restrictive (43)	Protect areas from development (31)
Restricts intensive recreation (26)	Protect areas from timber harvest (22)
Restrict roads (19)	Protect areas from general misuse (12)
Impact on local economy (9)	Last chance (8)
Restricts timber harvest (4)	Wildlife values (3)
Enough already (1)	

5. Readers interested in examining actual reports based on a Codinvolve analysis are referred to: (1) Hendee and Clark, Summary of National Public Response to the Roadless Area Review Draft Environmental Impact Statement, 53 p., mimeo (1973). Available from the Director of the Division of Information and Education, U.S. Forest Service, USDA South Building, Washington, D.C. 20250. (2) Jack, A Summary of Public Response on the Final Environmental Statement Concerning the Proposed Pelican Butte Winter Sports Development, 24 p., mimeo. Available from the Forest Supervisor, Winema National Forest, U.S. Forest Service, Post Office Building, Klamath Falls, Ore. 97601. (3) U.S. Forest Service Recreation Research Project, Public Response to the Olympic National Park Draft Wilderness Proposal and Master Plan–Summary and Analysis, 94 p., mimeo. Available from the Regional Director of the Pacific Northwest Region, National Park Service, 4th and Pike Building, Seattle, Wash. 98101.

CASE STUDIES OF CODINVOLVE APPLICATIONS

Since Codinvolve was developed in early 1972 it has been used in over 30 studies to analyze more than 50,000 public inputs. We have been involved directly in many of these studies in working with administrators to apply and adapt the system as necessary to meet their needs. The flexibility built into Codinvolve is a result of this close collaboration between research and management in the application of social science skills to solve a real resource management problem.

Every application has had unique problems and has required a slightly different approach (depending on a combination of factors including number and kind of inputs and complexity of the issues discussed). The issues of concern have varied, ranging from a single well-defined topic to a broad array of complex issues. In every case, however, the basic criteria on which the system is based and the five steps, as outlined, have guided analysis.

Following are descriptions of four sample cases in which a Codinvolve analysis was completed. They were selected to demonstrate how flexibility built into the analysis system compensated for the diverse problems encountered. In each case a comprehensive, written report summarizing the input was given the decisionmaker to review and consider along with other decisionmaking factors.

DDT and the Douglas-fir Tussock Moth

1. Issue: In the fall of 1972 results from a survey conducted by the U.S. Forest Service of Douglas fir tussock moth populations indicated that unacceptable damage would occur in the forests of southeastern Washington and eastern Oregon in the summer of 1973. The potential outbreak threatened private, state, and federal lands. The agency submitted a draft environmental statement assessing the potential damage and alternatives for control to the Council on Environmental Quality in February of 1973. The Forest Service analysis indicated that no other effective methods were available, so the agency applied to the Environmental Protection Agency for authority to use DDT. The draft environmental impact statement was also submitted to EPA to document the necessity for using the chemical. The citizen input received by the Forest Service generally focused on this single issue, i.e., whether or not DDT should be used to control the outbreak.

2. Type of input and number received (with the number of inputs and number of signatures included in all summaries):

Inputs		*Signatures*
Personal letters	514	626
Reports	9	9
Petitions	11	1,197
Form letters	268	276
Resolutions	18	30
Other	7	8
TOTAL	827	2,146

Local concern sparked several campaigns to win citizen endorsement for using DDT. This was apparent by the number of petition signatures and form letters received by the Forest Service. All favored using the chemical.

3. Strategy of analysis: This particular analysis was as straightforward and simple as any done to date because of the clearly-defined focus on a single issue. Edge-punch cards were used to summarize and store opinions and reasons which the input expressed. All tabulating and listing of reasons was done by hand-sorting the completed cards.

4. Time required for the analysis: The entire analysis, including preparation of a 27-page report summarizing the input, required less than one week.[6] Five coders were employed, who each coded an average of more than 50 inputs per day.

5. Problems encountered: Severe time constraints were present in this application of Codinvolve. To be effective, treatment of the tussock moth outbreak had to begin by June 1 at the latest. Contracts for the job had to be let at least 30 days prior to that time. In addition, the Council on Environmental Quality required that the final environmental impact statement be submitted to them 30 days before any proposed action. Thus, the Forest Service had less than 30 days from the cut-off date for public input (March 30) to complete an analysis of the public input and prepare the final environmental impact statement. Fortunately, a staff previously trained in Codinvolve analysis was available at the Forest Service's recreation research project. This, coupled with some long workdays, permitted completion of the job within the time constraints. The report on the public input analysis was included in the final environmental impact statement.

6. Balance of opinion: It was unusual to find that virtually all opinion supported the proposal to use DDT. Relatively few people indicated preference for such other alternatives as biological controls,

6. See Kelley and Rompa, Public Opinions About Controlling the 1973 Douglas-Fir Tussock Moth Outbreak, 27 p., mimeo. Available from the U.S. Forest Service, Pacific Northwest Region, Division of Timber Management, Portland, Ore. 97208.

other chemicals, harvesting to control, or doing nothing. Many people expressed three concerns. First, their support was based on this case only; they did not favor blanket use of the chemical. Second, while many favored biological controls, they felt DDT was acceptable in this instance because effective alternatives were not available. And third, they called for close controls and monitoring while DDT was being applied. A variety of economic, aesthetic, and environmental reasons were given to support their opinions.

7. Outcome: Although the decision contradicted the wishes which most citizens had expressed, the Environmental Protection Agency ruled against using DDT to control the 1973 infestation. The outcome illustrates that public input is only one factor in the composite of variables that enter into a decision.[7]

Pelican Butte Winter Sports Development

1. Issue: In the mid-1960's, local citizen groups proposed the development of a major ski area near Klamath Falls, Oregon. An intensive study was begun by administrators of the Winema National Forest to determine the suitability of the Pelican Butte area for a winter sports facility and to assess the impacts of such a development. A draft environmental statement was submitted early in 1972. Before this there was little evidence of public concern about such a development. But severe criticism erupted after the environmental impact statement was made public. Consequently, the Forest Service held public meetings after the final statement had been released before deciding whether a prospectus should be issued for development of the area.

2. Type of input and number received:

Inputs		*Signatures*
Personal letters	495	623
Petitions	8	645
Form letters	137	137
Reports	3	3
Multiple input (written and oral statement from the same person)	95	51
Oral statements from public meetings (transcribed)	33	34
Other	1	2
TOTAL	772	1,495

7. Since the original ruling in 1973, the process described above has been repeated. EPA re-evaluated the problem and, with another major tussock moth outbreak in 1974, the use of DDT was granted on a one-time basis only. Spraying was completed in early summer, 1974.

3. Strategy of analysis: The analysis was, in a technical sense, very similar to that for the DDT controversy. Edge-punch cards were used for coding, storing, and summarizing public comments. A report to decisionmakers included tabulation of all opinions and lists of every reason given to support them.[8]

4. Time required for the analysis: Two coders worked part-time for slightly more than two weeks. The nature of individual input varied from simple to complex discussion, but the average coding rate was approximately 50 inputs per day. The professional staff worked part time for an additional six weeks to summarize the material and prepare a report.

5. Problems encountered: Technically, the analysis proceeded smoothly throughout each step in the process. However, it was apparent that many comments included in the inputs were not related directly to the specific issues of concern, i.e., the proposed ski development. Many people discussed related allocation or management issues that, while not of immediate concern to decisionmakers, had important implications for management of other lands. For instance, some comments dealt with timber harvest methods and road construction standards. The storage and retrieval capability of the Codinvolve system enabled the analyst to include all such information on edge-punch cards during the coding process, securing it for use at a future time. Information is always costly to obtain, and the capability of Codinvolve to retain data means valuable input need not be disregarded simply because it does not bear directly on the issue at hand.

Several other problems indirectly related to analysis were encountered. Citizens expressed concern over how their input was being used. Many feared that votes were being counted or that their input would not be used at all. Others were suspicious of how the input was being handled and suspected their views might be distorted. Consequently, Forest Service personnel managing the analysis opened the process to inspection by interested citizens, and a local newspaper featured an article about Codinvolve (visibility). As citizens began to appreciate the distinction between analysis and evaluation, and as they became aware of how the Codinvolve system protected the integrity of their views, their concern diminished.

6. Balance of opinion: Sentiment toward the proposed development varied depending on whether one considered the number of inputs or the number of signatures. A majority of inputs favored development. But because several petitions contained numerous

8. Jack, *supra* note 5.

signatures, the majority of all signers opposed development. Common reasons offered in support of the ski area were that it would foster economic growth and, if properly planned, would fulfill local as well as regional and national needs. Citizens rejecting the development were concerned about the number of people who would be attracted to the area and the potentially adverse effect on local life styles, wildlife, and the environment. A variety of additional reasons offered important insights into the values held by the public. Several criticized inadequacies in the environmental impact statement.

7. Outcome: With the basic report of the Codinvolve analysis as an index of public concern, local Forest Service decisionmakers responded in writing to each issue raised by citizens, even if only one person had raised it. Based on a reexamination of land-resource capability data, new information provided in the public response, and existing data on other relevant factors, the decision was made not to pursue development at present. More comprehensive analysis of alternatives and impacts was deemed necessary before any development should proceed. Copies of separate reports on the Codinvolve analysis of public input, the evaluation of the input, and the final decision were distributed to interested groups and concerned citizens.[9]

Salmon River Wild and Scenic River Proposal, and Idaho Primitive Area and Salmon River Breaks Primitive Area Wilderness Study

1. Issue: Two interrelated allocation issues were of concern in this example. Approximately 60 miles of the Salmon River in Idaho were under study for possible classification under the Wild and Scenic Rivers Act of 1968. The Forest Service proposed four alternative classification schemes for the river, ranging from classification of a major section of the river as "wild," with Wilderness Classification overlapping the river and adjoining land areas, to no classification for the river whatsoever. Six different alternatives were outlined for the two areas, ranging from a strictly managed Wilderness proposal encompassing both areas and the Salmon River on the one hand, to complete declassification of the entire area on the other.

This was a complex set of issues, with a variety of possible combinations of river and primitive area proposals. The objective of the

9. In addition to the report on public input, local decisionmakers prepared separate documents describing their evaluation of the public input and the basis for the final decision. Copies can be obtained from the Forest Supervisor, Winema National Forest, U.S. Forest Service, Post Office Building, Klamath Falls, Ore. 97601.

land use study was to develop directions for the future management of the entire area for submission to the President and to Congress, as required under the terms of the Wilderness Act and the Wild and Scenic Rivers Act. Public comment was requested on both phases of the study.

2. Type of input and number received:

	Inputs	*Signatures*
Personal letters	544	625
Response forms	2,135	2,229
Workshop input	4,079	5,642
Petitions	1	229
Reports	2	2
Form letters	37	40
Other	7	8
TOTAL	6,805	8,775

3. Strategy of analysis: In contrast with the first two cases, this analysis was complicated by the large number of fairly complex inputs. Because of the difficulty in sorting and tabulating nearly 7,000 edge-punch cards by hand a computer was used to compile the tables. As in the previous cases, all opinions and supporting reasons contained in the input were initially entered on edge-punch cards. Opinions on major issues were then transferred to ADP cards for computer analysis. Supporting reasons which were written on the cards were then summarized by hand from the edge-punch cards.

This combined use of edge-punch cards and the computer allowed several objectives to be achieved. The massive sorting and tabulating process was facilitated by computer backup, while storage and retrieval of a wealth of public input about many issues and areas was made possible by use of the edge-punch cards. In this particular study, hundreds of tables could have been produced arraying the many opinions by important variables such as form of input, who responded, and residence of respondent. Although hand sorting of edge-punch cards is possible and has been done in studies of similar size, the computer is more economical if the capability is available.

4. Time required for the analysis: Six weeks were required to complete this analysis. Eight coders were employed. The coding rate varied from 30 to 50 inputs per day for letters and about 150 per day for the structured response forms.

5. Problems encountered: In an effort to facilitate broad public participation in the study, the Forest Service team developed several different structured response forms for the public.

Some asked for a ranking of preference for the various alterna-

tives. Others asked for a statement of how acceptable the various alternatives were. Measures of public sentiment obtained from these forms were nonadditive. The well-intentioned effort to ease public access to the decisionmaking process was offset by problems in the analysis phase and subsequent evaluation of the input.

The study provides an excellent example of the interdependence of all the public involvement processes. For instance, the overall pattern of sentiment on a land management issue normally can be shown with only a few summary tables. In this study, more than a dozen tables were needed to obtain this overview because of the way in which the input was obtained.

The complexity of the issues, coupled with the large amount of input, required the use of a computer. A special computer program was developed to provide both summaries of individual opinions as well as cross-tabulations of opinions of important variables, such as form of input, who responded, and residence. It also collated views by number of inputs and number of signatures.

A special transferring process was necessary to move information punched on edge-punch cards to ADP worksheets for card-punching. Although the transferring process is quick, the number of times information has to be handled increases the possibility of error, requiring more checks for accuracy.

6. Balance of opinion: A complex picture of public sentiment on the two issues emerged from the analysis.[10] With regard to the Salmon River, most persons who used structured response forms favored no classification at all. Protection of local landowner rights and the local economy were common reasons for this position. Most support for a "wild" classification came from non-local residents, generally in personal letters.

A similar pattern emerged in response to the six Primitive Area proposals. Again, there were significant differences in opinion according to the type of input. For instance, input obtained from public meetings reflected greater support for restrictive classification that did written input.

The analysis also revealed the view of a significant minority (a coalition of conservation groups) who proposed a substantially larger wilderness than did the Forest Service.

7. Outcome: After the public input was analyzed the Forest Service prepared a proposal regarding the area's future management for submission to the President and Congress. The proposal calls for

10. See Dahlin, Hunter, Haaser, and Bolt, Analysis of Public Inputs to the Salmon River Study and the Idaho and Salmon River Breaks Primitive Areas Study. Available from Forest Supervisor, Bitterroot National Forest, 316 N. 3rd St., Hamilton, Mont. 59840.

classification of a 1.5 million acre wilderness with the Salmon River managed under the Wild and Scenic Rivers Act. The proposal was presented to the public in early 1974, and nearly 10,000 additional inputs were received which were analyzed using Codinvolve. The final outcome awaits action by Congress.

The outcome of this case to date demonstrates two important aspects of public involvement. First, the use of public involvement in decisionmaking is more than a matter of counting votes. The tentative decision made by the Forest Service was contrary to the aggregate measure of public opinion, which called for declassification of the area. The extent to which the agency made a defensible weighing of the input (the evaluation process) awaits legislative and, possibly, judicial review. In any case, the visibility and traceability of the Codinvolve analysis process will allow proponents as well as opponents of the Forest Service to draw their own conclusions about the public input received.

Second, the different opinions surfacing from different types of input, as well as the variations in sentiment according to residence, demonstrate the need to maintain the identity of the input throughout the analysis. In the evaluation process, Forest Service officials were able to review this differential pattern of opposition and support and, accordingly, make judgments about the relative significance of the various perspectives.

Roadless Area Review

1. Issue: In early 1971 the U.S. Forest Service began a nationwide review of its lands to identify roadless areas which could be studied for potential wilderness classification. At that time this was the largest land use study in the United States to involve the public in the decision process. The review affected the disposition of 55.9 million acres of National Forest lands. The procedure drew extensive public involvement, including more than 300 public meetings with attendance of over 25,000 persons. More than 60,000 inputs were received by the agency.[11]

As a result of this inventory the Forest Service prepared a draft environmental impact statement which identified 1,448 roadless areas in National Forests. Of these, 235 were proposed by the agency as suitable for wilderness classification determined by such factors as suitability and capability for various uses, public input, environmen-

11. For a more complete description of the Roadless-Area Review, see J. Hendee, Public involvement in the United States Forest Service Roadless-Area Review: Lessons From a Case Study. Available from Recreation Research Project, 4507 University Way N.E., Seattle, Wash. 98105.

tal-protection considerations and others. Public reaction to the draft EIS, as well as a variety of citizen proposals, were contained in nearly 7,000 inputs received by the agency. Nearly 200 additional roadless areas not described in the EIS were also discussed publicly.

2. Type and number of inputs received:

Inputs		*Signatures*
Personal letters	5,301	6,186
Petitions	155	7,549
Form letters	591	897
Reports	502	655
Others	184	184
TOTAL	6,733	15,471

3. Strategy of analysis: A variety of opinions and reasons concerning 1,600 acres was received. This complexity precluded easy use of edge-punch cards and hand-sorting procedures. Consequently, the Codinvolve procedures were adapted for direct computer analysis. All opinions and supporting reasons were processed by computer. To maintain the identity of the input and the ability to include specific comments about a wide variety of areas and issues, an open ended coding system was developed. This approach allowed continuous addition of new codes; comments were not forced into preconceived categories. The open ended approach allowed the content of the input to define categories as they were encountered. Computer programs were written to summarize the resulting data.

4. Time required: More than six weeks were required for analysis. Thirteen coders (six fulltime) and a computer programmer were employed on the project. The coding rate varied from 20 to 50 inputs per coder per day. Several large reports from organizations, however, required up to a full day to process. Concurrent with the coding process, the computer program was made ready to handle what turned out to be one of the most complex jobs ever run through the University of Washington computer facility.

5. Problems encountered: Several difficulties were associated with this analysis. The major problem—number of areas discussed in the input—necessitated direct computer analysis. Development of the open ended approach, which was necessary to maintain the integrity of the public input, called for a high degree of technical expertise in computer programming.

The coding process proved to be cumbersome because 1,600 areas across the nation were referred to by a variety of names and code numbers. Coders were able to solve this problem by individually working with all the input which referred to a specific Forest Service

Region or National Forest. When confusion in area names was encountered, a call to local managers usually helped resolve the matter.

Because of limitations in computer storage capacity, the job had to be run in segments. A variety of opinions and supporting arguments about how specifically to manage over 1,600 roadless areas quickly filled the system's capabilities.

6. Balance of opinion: Public comments fell into three broad areas: (1) The Forest Service roadless area review process, (1) alternative land management strategies, and (3) specific roadless areas. Nearly all input discussing the Forest Service inventory process was critical. Many conceptual and technical shortcomings in the draft EIS were discussed.

General comments, i.e., those which did not address specific areas, tended to cluster around two themes, the first being generally supportive statements about wilderness classification ("Let's classify all the lands as wilderness that we possibly can"), and the second arguing in favor of "multiple use" of National Forest lands.

In response to the Forest Service's proposed list of wilderness study areas and other specific areas, the balance of opinion indicated that more areas should be proposed for study. Considerable effort was made to support these views, reflecting the strong value preferences held by many writers. This influenced the decisionmakers when interpreting and evaluating opinion as to when and how many roadless tracts were to be included on the list of proposed wilderness study areas.

7. Outcome: A 52 page summary of the input, plus computer printouts containing a summary of opinions and reasons, was provided for review to all relevant decisionmaking levels in the Forest Service.[1 2] Based on a review of this and other considerations, the number of areas proposed by the agency was increased from 235 to 274, representing an additional 1.3 million acres. A final Forest Service environmental impact statement containing the report on the analysis of public input has been submitted to the Chief of the Forest Service for review. Alternative citizen proposals, some proposing more and others fewer areas, have also been presented to Congress.

These four case examples represented a range of issues for which a Codinvolve analysis has been conducted. The procedures used and problems encountered are typical for most issues. The number and kind of inputs, number and complexity of issues discussed, and level

12. Hendee and Clark, *supra* note 5.

of analysis required for other applications are variables analysts must consider in determining the specific approach best suited for the job at hand. In all cases, however, the criteria and basic steps outlined earlier in this paper should guide the conduct of the analysis.

ISSUES RELATED TO ANALYZING PUBLIC INPUT

Several issues which have important implications for the analysis and the usefulness of public input have surfaced from our experience in public involvement. In the following discussion, we attempt to summarize some of the major lessons we have learned.

Analysis vs. Evaluation of Public Input

As indicated earlier, decisionmakers and analysts must keep the analysis process free from evaluation. Issues such as the quality of the input, the relative weights to be assigned to various forms of input, representativeness, and vote counting are matters of evaluation, *not* analysis. The only responsibility during the analysis is to summarize accurately the entire content of the input received. Whether or not the input is representative of potentially affected interests, or whether petitions should be weighed as much as, or more than, letters, must be considered only after the analysis is completed. To confuse these two processes threatens the credibility of the analysis.

Perhaps the most difficult part in learning to use Codinvolve is to maintain objectivity and to avoid interpreting what the writer means. This often is a problem because many citizens appear confused by the issues under consideration or base their arguments on faulty logic, or in some cases on misinformation. Nonetheless, the analyst must deal *only* with what is said. He must accurately summarize all comments, whether emotional, uninformed, or confusing. Once this job is done, then the evaluation process can begin, and responsible personnel can judge the input as a whole, rather than sentence by sentence. The analyst may, in fact, ultimately be responsible for evaluating the input, but the key is not to do it during the analysis.

Quite often, the summary of public input identifies areas where people might have been confused or misled. Knowing what the confusion is and how it came about can help decisionmakers respond constructively. However, were these comments interpreted or filtered out during analysis, decisionmakers would not have an accurate picture of what their various clients really were thinking. An accurate analysis thus serves as a feedback mechanism to administrators, pro-

viding important clues on how well information is reaching the public.

Opinions and Reasons Are Important

Knowing the balance of opinion (numbers for and against an issue) and the supporting rationale (why they are for or against) is critical. The analysis must, therefore, include an accurate description of all opinions and their supporting reasons in a form for easy review and consideration.

Public concern (and that of many land managers) over vote counting, consideration only of how many favored or opposed an issue, points out the need to define clearly to the public how its input is used. Managers must consider the values implicit in public input in relation to other legal, fiscal, resource capability, and environmental factors in reaching a decision. The combination of opinions *and* their supporting reasons define these values in any issue.

As in several cases described earlier, decisionmakers do not always follow the majority rule in land management. But the analysis of the public input received must clearly identify the alternative values held by the public, and the evaluation must document how those values were balanced against other factors in reaching the decision.

Cost and Time Requirements for a Codinvolve Analysis

Analyzing the content of public input might appear deceptively easy. Often we have been asked to "drop by this afternoon to show me how it works . . . I want to analyze 5,000 letters tomorrow." However, as with most analysis systems, learning and using Codinvolve requires an investment of time and money on the part of managers, technicians, and coders. The analysis of public input cannot be a last minute, add-on item. Sufficient time and budget must be allowed early in the land use planning process to insure an adequate job.

Although cost norms have not yet been established, past experience indicates that Codinvolve analysis usually runs between one and three dollars per input, depending on the complexity of issues, number and length of inputs, and level of analysis required.

A decision to use Codinvolve or any other system capable of providing similar information is a decision to commit funds and people. However, in most cases using the system involves a rather minor expenditure (as little as five percent in one instance) in relation to the total investment in any land use planning study. The potential benefits in quality land management seem well worth the cost.

Structured vs. Unstructured Input

Many attempts have been made to structure the form in which the public provides comments. These include response forms, checklists, and questionnaires. In most cases, the motivation for structuring the input seems to have been to make the analysis process easier, i.e., it is easier to count boxes than to decipher comments in an unstructured personal letter.

Unfortunately, as the Salmon River example illustrates, such structuring does not ensure useful input. Our experience, and that of many land manager colleagues, indicates that the nature and quality of information obtained are severely restricted when obtained by structured input. With the availability of a system like Codinvolve, much of this structuring would appear unnecessary. Efficient and accurate analysis is possible even with diverse forms of unstructured input.

Thus, we feel that structuring how the public provides comment is inappropriate and unnecessary in most cases, because personally written letters generally provide a more detailed picture of the writer's views. It is better to provide sufficient information about the issues for which comments are being solicited and to urge citizens to respond in their own language. It also should be made clear that other comments are welcome.

Response forms are best used to focus public comments on the important issues, rather than structuring how public input is provided. They should always be combined with well-publicized opportunities for unstructured public response. And with Codinvolve accurate analysis is still possible regardless of the form in which it is received.

Use of Computers

Codinvolve is a systems approach for analyzing public input; computers and edge-punch cards are two tools used to do the job. The choice of which tool to use depends on a variety of considerations: the amount of input, its complexity, availability of personnel, time, etc. Computers simply aid analysis; there may be serious problems if their use is regarded as an end in itself rather than simply as a tool.

Our experience with Codinvolve has involved computers in two different ways—a supplement to the edge-punch, card-sorting system, and complete computer adaptation. For most cases, the latter approach is not recommended unless highly skilled technicians are available. Even then computer applications are dangerous, unless open ended programs can be developed which do not force the

public's comments into preconceived, and perhaps arbitrary, categories. Such programs are difficult to develop and often are beyond the capability of those doing the analysis. In any case, complete training in using Codinvolve will be necessary before an adequate job can be done in meeting the criteria spelled out earlier in this paper. Public input analysis should not be turned over to computer analysts until such training has been completed.

For most jobs either the edge-punch, card-sorting procedures used alone or in conjunction with computers will provide efficient analysis and summary, even at field locations. The edge-punch system is easy to use and has the capability to store large amounts of information. However, as the number of inputs reaches moderate numbers (1,000 or more), computer backup can be useful. We have sorted over 5,000 cards by hand in several past analyses. Although considerable time is required, the job can be done with little training.

As discussed earlier, a special program developed for Codinvolve analyses provides an alternative to hand-sorting all information punched on the edge-punch cards. The edge-punch information is transferred through a simple overlay process to ADP cards. The computer then duplicates the sorting process and provides whatever tabulations of opinions are desired. Reasons, however, must generally be summarized by hand from the edge-punch cards.

Using the computer in this manner has several advantages if conditions are suitable. First, it can save time and expense if large numbers of inputs must be analyzed. Second, computer tabulation is virtually error-free, assuming a low level of key-punch error. With large numbers of cards to sort by hand, counting errors are difficult to eliminate completely. Third, the computer allows more complex analysis in a shorter period of time than is possible by hand sorting.

Storage and Retrieval of Public Input

Many resource decisions are resolved over an extended period of time, with public input received continuously. Much of the information received by resource managers contains information that will be useful in the future. Consequently, the system used to handle input must include provisions for easy storage and retrieval of specific information and/or particular inputs. The edge-punch card has proven useful for summarizing and retrieving opinions and reasons about many issues.

This capability makes the system particularly useful in land use planning underway in several U.S. resource management agencies. As allocation issues are resolved, management alternatives must be considered. Much public input previously submitted with regard to

how much land to allocate to various uses also contains valuable information on how that land should be managed. With this information entered on the edge-punch cards, it is within easy reach of managers and planners at all planning levels. This feature has been pointed out by several managers as a major benefit of analysis. Also, where a series of similar land allocation issues follow one another, information gained from one can be of considerable value as planners begin to formulate plans for the next.

Acceptance of Codinvolve by Managers and the Public

Response by decisionmakers who have used the Codinvolve system has been enthusiastic. The system has provided a way to contend with large quantities of diverse input. Their response, however, has been tempered by the extent to which they understand the principles and criteria upon which the system is built and on how the output of the system is to be utilized.

Early in the development and use of the system we frequently encountered instances when managers had assumed the Codinvolve system would perform evaluative functions. For example, during the design stage several managers asked that the system be designed to categorize the quality of information, or that only substantive information be coded. As we have already discussed, these examples required judgments about the importance of information which is not a function of the analysis. The analysis phase delivers information to the decisionmaker in an undiluted, nonjudgmental state; it is the responsibility of the decisionmaker to gauge its value.

However, once decisionmakers understand the role of Codinvolve in this relationship, their support of the system has been high. In particular, managers who have used Codinvolve have indicated the importance of the information the system provided for the land management job they faced.

Managers have stressed the value of being able to review the diversity of public input. Where decisions are in line with public wishes, it is possible to document this clearly. Where decisions run counter to expressed public will, managers can outline more accurately the rationale for their decision because they can identify specifically the character and extent of public opposition as well as support.

Citizens likewise have generally endorsed the Codinvolve system. Presentations on the system—the principles and criteria upon which it is based or how it can be used—have been made to a variety of citizen groups.

Public support of the system has, as in the case of managers, been

contingent upon understanding what it does. A particularly important feature of Codinvolve to which citizens have responded favorably is its fair treatment of all input, its recognition and recording of general expressions of values, as well as site- or issue-specific information. Through Codinvolve the citizen is able to see how his input has been handled and that the emotional content of input has been retained. When citizens have been invited to see how Codinvolve treats their inputs, most have been impressed with the evidence that their views were protected and that their comments were not simply reduced to numbers. The visibility of the system's operation, and the fact that it does not make decisions seem to be major reasons for public acceptance.

CONCLUSIONS

Citizen participation in decisionmaking has become a fact of life for resource management agencies in the United States. The Codinvolve system for analyzing public input is a response to pressure to facilitate this effort.

We have cited what we believe to be enthusiastic acceptance of the system on behalf of administrators as well as citizens. But perhaps the ultimate judge of how useful Codinvolve or any other analysis system is will be the impact of these techniques on the decisionmaking process. Will improved analytical techniques make any difference?

We are encouraged by the success of this venture on several accounts. Effective analysis of public input does seem to have made a difference in the many applications of Codinvolve completed to date. Some of these influences are apparent in the case studies described in this paper.

We are also encouraged by the rate at which the Codinvolve system is being diffused throughout the Forest Service. In September 1973, after analysis of the inputs to the Roadless Area Review, a Forest Service workshop on public input analysis was held in Seattle, Washington. A cadre of 35 people from the Forest Service across the nation learned to use Codinvolve for analyzing public input. They are now applying the Codinvolve system to management issues in their home regions and are holding training sessions to extend the technique further. Interest also has been generated in several other resource management agencies in the U.S.

A NOTE TO OUR SOCIAL SCIENCE COLLEAGUES

Our efforts in focusing social science skills on an important re-

source management problem have been met with acceptance and enthusiastic support. To be sure, problems have been encountered, but the overall commitment by the concerned parties to do a better job of using public involvement in the decisionmaking process generally has assured success.

A variety of philosophical problems related to public involvement remain unsolved.[13] Social science input to the resolution of these problems will be necessary to assure effective public involvement programs.

It is our honest conclusion, after more than three years of intense collaborative efforts with our manager colleagues in applying and adapting the system, that there is a willingness to move to new relationships between administrator and citizen, and administer and social scientist. We urge our social science colleagues to apply their respective skills in order to facilitate both of these relationships.

13. Stankey, Hendee & Clark, Applied Social Research Can Improve Public Participation in Resource Decisionmaking, 40 Rural Sociology 67-74 (1975). Available from Forestry Science Lab, Drawer G, Missoula, Montana, 59801.