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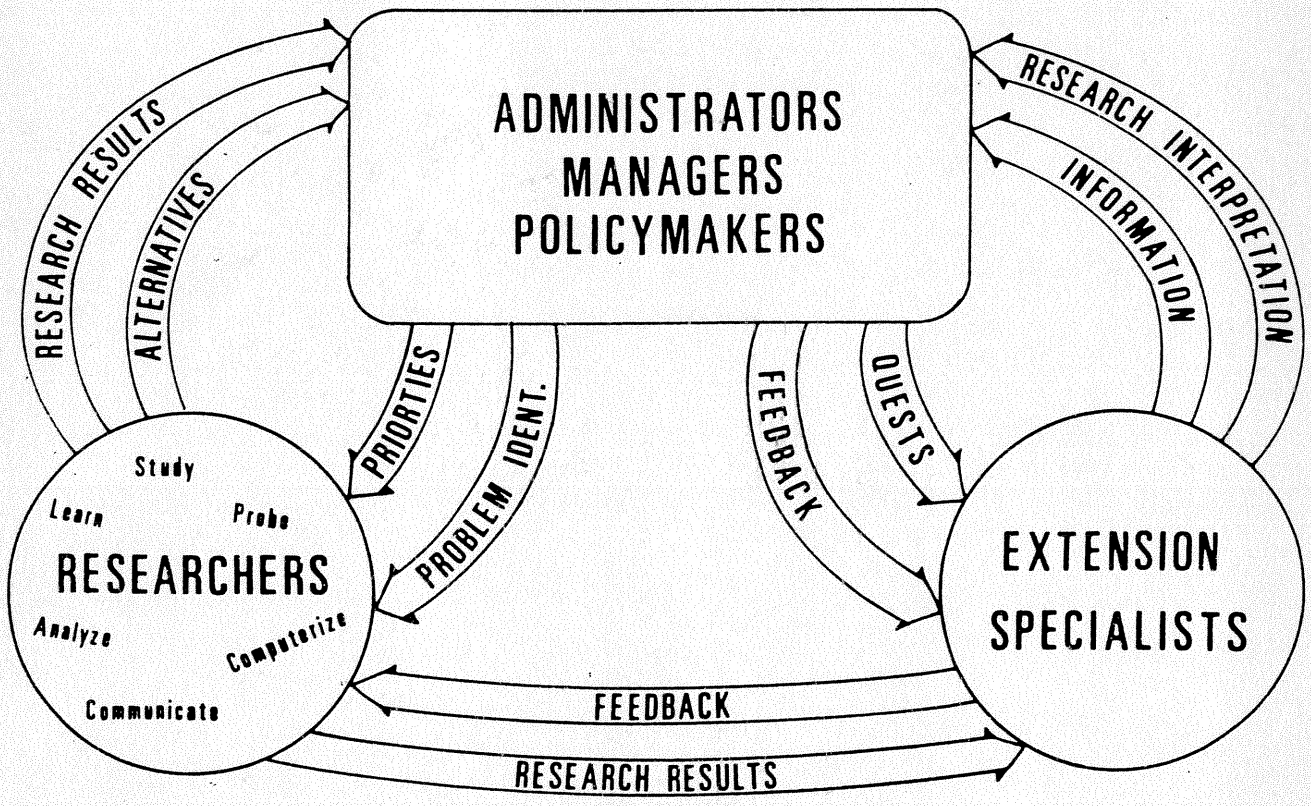

PROCEEDINGS

of the

SOUTHERN STATES RECREATION RESEARCH

Applications Workshop

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September 15-16, 1975

Proceedings
of the
Southern States Recreation Research

Southeastern Forest Experiment Station
Forest Service, U.S. Department of Agriculture
Asheville, N.C. 28802

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FOREWORD

North Carolina State University; the Forest Environment Research Divisio USDA Forest Service; and the Southeastern Forest Experiment Station, USDA Forest Service sponsored this regional Workshop for recreation managers and planners in the Southern States. The objectives of the Workshop were to provide for interaction among recreation scientists, extension specialists, and managers and planners and to exchange ideas and attitudes concerning the usefulness and applicability of the knowledge which has been generated through recreation research. A special emphasis was placed on the effectiveness with which researchers communicate their results to managers and planners and with which research needs are communicated to researchers.

Attendance at the Workshop was limited to 80 specifically invited recreation resource managers, planners, researchers and extension specialists. Invitations were extended to those who had demonstrated interest and accomplis ment in the field. Active participation by these invitees in discussions was strongly urged and the Workshop format was designed to encourage maximum participation.

Attendees at the Workshop included personnel from:

- State recreation and/or planning agencies
- State game and fish agencies
- Private forest industries and private recreation enterprises
- Federal agencies including USFS, BOR, SCS, TVA, and the Corps of Engineers
- Recreation extension units
- Local (county and urban) recreation agencies
- Universities.

In general, the sessions on the program followed the format outlined belo

1. A general topic for discussion was listed
2. A panel of speakers presented papers on the topic
3. A brief question and answer period followed each speaker
4. Assigned critiquers reviewed papers prior to the presentations, developed key questions about the papers, participated in the question and answer phase of the program, and comprised part of the panel during formal discussions
5. After papers were presented in a given topic area, all attendees participated in one of four small-group workshop discussion sessions. Each discussion group had a previously assigned discussion leader and a recorder. The objective of each group was to further discuss the papers presented and to develop recommendations and questions on the topic.

6. Workshop groups returned to the main auditorium and discussed the topic with a panel composed of the session speakers and the critiquers of the speakers' papers.

Based on reactions after the Workshop, the program and format for the proceedings were judged to have been highly successful. Practically everyone in attendance had an assigned role as a speaker, critiquer, topic session chairman, discussion leader or discussion recorder. This resulted in a very open and involved level of communication and prevailed upon the attendees to devote close attention to the presentations.

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CONTENTS

TOPIC I

INTERRELATIONSHIP OF RECREATION MANAGERS,
EXTENSION SPECIALISTS AND RESEARCHERS

ABSTRACTS

COTTRELL

The Managers' Viewpoint: Research and Applicability of Results.--The host of recreation research oriented meetings around the Nation reflects serious problems in communication and dissemination between researchers and managers. Dialogue between these professionals is missing, misunderstood, or minimal.

This paper exposes and explores a few of the "why's" of our dilemma and recommends some possible cures.

CROWE

Interrelationships of Recreation Managers, Extension Specialists and Researchers.--Southern Extension educators conclude that recreation research will be more fully used by resource managers when each of the management-research-Extension components function as a team. Teamwork demands mutual respect, agreement on goals and methods, cooperation, and communication. Often Extension recreation education must be basic, causing a significant lag in current research communication and application. However, greater Extension efficiency would result with a) expansion of responsive and relevant research, b) formal mechanisms for Extension-research collaboration, c) larger numbers of Extension specialists and researchers, d) expanded technical support of the county delivery system, and e) development of non-traditional, education-maximizing modes of devivery.

WARE

Relating Recreation Research to Management Decisions.--There are well-known difficulties in doing directly applicable research, communicating research results, and in applying research results in practice. Some of these difficulties stem from unclear specifications of the roles of managers, extension specialists and researchers. Additional difficulties stem from lack of a common framework for discussing management decisions, how information is ideally used in management, and hence, the role of research in providing information useful in management. Management science provides an appropriate framework. This framework provides a basis for assessing the current state of the difficulties in recreation resources management and research and for exploring some general possibilities for improving the relationship.

THE MANAGERS' VIEWPOINT: RESEARCH AND APPLICABILITY OF RESULTS

Richard L. Cottrell[1/]

Abstract.--The host of recreation research oriented meetings around the Nation reflects serious problems in communication and dissemination between researchers and managers. Dialogue between these professionals is missing, misunderstood, or minimal.

This paper exposes and explores a few of the "why's" of our dilemma and recommends some possible cures.

Additional keywords: Recreation research, research application, research communication, extension programs, research dissemination, forest recreation, research evaluation.

INTRODUCTION

If your fantastic research findings were in great demand in the market place, we wouldn't be attending this workshop!! Nor would we have met last fall in Estes Park, Colorado; or at Brandon Springs, Tennessee; Athens, Georgia; Washington, D.C. or other places. Research findings aren't known to a majority of recreation managers; aren't available in a usable form; can't be understood when they are available; and, most of you know it! Thus, we are joined together as friends and countrymen for candid exchanges and to seek ways to improve.

As a prelude to my taking up the big stick allow me to provide a mini-self profile. With it I hope to soften a bit the upcoming blows.

I'm a patron of your science and your art--a depender upon your sage findings--an ardent seller (disseminator) of your goodies and your recommendations (that is, if I can find any recommendations) to a broad spectrum of the great unlearned--a member of a less than dynamic NRPA Task Force on Outdoor Recreation Research--cooriginator of a similar research workshop last spring at Land Between The Lakes--a frustrated suggestor and designer of research studies--and a fellow who has 5 APPLIED research studies (with 4 universities) going on in his area as he prepares this paper.

My ever expanding sharing of ideas and mistakes with--the academic community, the private sector, 15 or so agencies in the Federal park realm, countless state recreation folks, involvement in 6 or 7 professional societies, 15 years in the USDA-Forest Service fighting with timber beasts and other assorted recreation antagonists, my association with the new breed of

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cat you call the disseminator, and my work with researchers from the Western Hendees to the Southern Swinfords, James, and Cordells, to the Wagars, Chilman, and Burys provide the basis for my questions, criticisms, and comments.

Ken Cordell asked me to explore with you some of the all too common dialogue between researchers and managers:

-- "Researchers are arrogant." "PhD's look down on ground grubbers who have less educations."
-- "Managers don't read what we write."
-- "Managers don't take time to study research results."
-- "Researchers keep talking about their poor reward system."
-- "Managers aren't interested in doing things better."
-- "If the scientific method doesn't fit the problem, research shouldn't be conducted."
-- "Managers are dumb."
-- "Researchers don't have common sense."

These excellent quotations could be followed with a host of equally worthless sayings. Since, as a manager-administrator, I've worked with research friends in resource agencies and in the academic realm, I can say folks involved in recreation research are generally top drawer. However, you've asked for candid criticisms so, let's explore a few.

HOW MANAGERS PERCEIVE THE EXISTING RESEARCH SYSTEM

Why is it managers and other field people aren't clammering for your fantastic findings? Perhaps we can find part of the answers in this series of introspective questions. Is your research geared to the urgent-immediate needs of managers? Have you presented (packaged) your results so they will sell? Can managers understand what you've written? Have you geared your writeup to management people or is it geared to fellow researchers? Do you aim at publications of interest to managers or publications of interest to no one? Do you describe the problem then prescribe the cure with step 1-10 recommendations? Did you work with management personnel in describing the problem or did you do a fine job without their help? Do you measure success with the number of articles printed and/or the number of pamphlets available for distribution? If your answers to these questions (or at least most of them) are yesses you pass--read no more!

Let's get back to your understanding of managers. They come in all sizes, shapes, colors; are one of 2 sexes; are generally overworked and--sad to relate--aren't waiting on you to save them. The writer has 20 years in 2 Federal Agencies, (16 in recreation), is colorblind, bald, 40ish, is

a graduate forester with "0" hours in outdoor recreation, works 6 + days/ week, uses research data frequently and enjoys his job. If you're interested in "ringing my bell" with your research--get to know me, my interests, my possible research needs, and the constraints of my job.

You somehow must make a genuine, concerted effort to understand the job challenges of at least the spectrum of managers in your research realm. What are you doing or what is your agency doing to see to it you have the opportunity to gain some experience in the exciting field of recreation management? Some of the most successful research I know of is being carried on by former managers or researchers who have taken time out to work in management.

A few weeks ago a research scientist located at a prominent northeastern university called and asked for my help. I was asked to be the state coordinator for his research needs questionnaire. This was to go to educators, private resort owners, other Federal and state administrators, key folks in user groups, recreation equipment suppliers, etc. "Why me??" "You were recommended for your extensive knowledge of recreation professionals in the state." Ho? I was busy, busy; but I would, when the questionnaires arrived do my best to help.

The questionnaires arrived on June 16. They were to be returned FROM the respondents by June 20! My first opportunity to review mail of less than Congressional urgency was July 7!! About this time, I received a less than friendly reminder from the researcher telling me the 15 respondents were tardy indeed!

My interest in working with you kept me from throwing this correspondence including the coded questionnaires into the nearest round file. We selected a broad cross section of respondents across the Commonwealth asking them (with a personal letter) to do me a favor by filling out the forms as soon as their busy schedule permitted.

Did the researcher understand the manager at his busiest time of the year--pre-July 4th!? Remember, I'm your friend; how would others less friendly have responded? Researcher arrogance--no; researcher insensitivity spiced generously with the flavor of ignorance--yes.

"The interpreter or disseminator--he will save us!" Extension Service personnel, recreation specialists in the Soil Conservation Service, BOR professionals, and even folks like me spend considerable time telling others about research findings. It seems now, though, these professionals are to be the prime linkage between the researcher

and the manager. This is a dandy scheme, one I'm sure which will be covered well, indeed, by the following speaker. If it works, the researcher can take even less responsibility for providing relevant answers in understandable language.

The extension specialist is part of the answer, but asking him to do a job you've failed to do won't help our common dilemma.

Of all the recreation research knowledge gathered here in the Eastern U.S. I find SEFES Research Note Number 171 the most needed and useful. It is Dr. Ripley's February, 1962 study entitled TREE AND SHRUB RESPONSE TO RECREATION USE. If deep-rooted young hickories are well suited to high impact use and shallow rooted species like scarlet oak, hemlock and white pine are poor risks, a knowledge of these findings is important across the eastern United States as a guide to saving tremendous amounts of maintenance dollars.

Yet, in my field trips with professors and students from countless universities and my lectures at maintenance conferences this 1962 information comes as a complete surprise. It's obvious the system isn't properly geared nor is it properly aimed.

Do you know there are over 90 agencies; commissions, committees, etc. in the Federal Government alone dealing with outdoor recreation? Do you know there are now over 300 college curriculums dealing with outdoor recreation in the United States, the majority of which have little or no resource orientation? The professors and students in these schools, the managers they've already produced, as well as recreation personnel in the previously mentioned Federal recreation sector, and countless other professionals and technicians are your market. Are you aimed at these folks or are you aimed at all?

Are you making an effort to find out the actual needs of managers? Research Needs Surveys are beginning to pop up from several sources. They key in on physical and social carrying capacities, economic benefits and other broad items, but I doubt if they will really help much in your quest to sell "products" to managers.

A few months ago I was asked (or better yet told) to sit down and make a laundry list of research needs for Land Between The Lakes. To my surprise, my hurried list included over 109 separate items. Some required basic research on the specific, but most of the items I listed could have been applied studies at the master's level. Once you learn all about that manager, force him to discuss his needs, then follow through and help him.

Are your research efforts directed at something useful? I know of graduate students at 2 universities who are still studying "overuse" and the 26 variables to good campsite design. "Overuse" is more likely Poor Planning - Poor Design and/or Poor Administration; and, the 26 variable scheme will have "0" utility to designers and managers alike. A few years ago the Forest Service, with yours truly as an accomplice - made extensive studies concerning grasses best suited to plant in areas of high impact (around picnic tables and camping pads where grass doesn't belong). This study, like the overuse studies, rest studies, and the 26 variables of site design are a waste of time and effort. They do not enhance your credibility or your appeal in the market place.

Considerable time was spent (to the amazement of management personnel) at the Estes Park Conference with researchers talking about their poor reward system. Management folks were turned off by the researcher pleas for better rewards. This was unfortunate, as the researchers were asking us to encourage their administrators to rate them on the amount of extension and dissemination they do as well as their output of scientific data.

A past history of available research grants together with an interest by several Federal and state agencies in recreation research have combined to give some research folks bad habits. The economy has plunged with resulting mini-budgets for research. Research organizations have been drastically reduced or eliminated entirely yet, the 48-50% academic community rip offs for overhead are still much in evidence. Had your attitudes and your products have been top drawer over the years managers might have given you a better position away from the sharp cutting edge.

Don't be too sure "all" managers don't read your dandy findings. I was chided a bit about one year ago by a research friend when I mentioned the need to find out just what kind-type-size-shape of campsite or campsites users preferred. "If you had really read my findings in a 6 year basic research study of 100 campsites in a N.F. campground in the Appalachians, you'd have the answers to your questions" sez the researcher.

After a bit of thought I said the study wasn't applicable to my original question. Seems I had designed the 100 unit N.F. campground; laid out all of the campunits (with little or no variety in size, shape, or type); laid them all out poorly by today's standards; and helped design his research study many years ago before he moved into the program. For some reason the subject wasn't raised again.

Professional societies at one time may have held the key to a part of research dissemination. NRPA planned to move into the field with considerable force. This didn't happen nor does it appear NRPA can take a strong recreation research leadership role. Certainly, it would be diffitult to say SCSA and the SAF have been excellent environments for recreation and recreation research. Seems to me and many others BOR should accept research promotion and dissemination as one of their most important jobs.

As you know, BOR is beginning to move in this direction. It should and it must; but BOR needs our strong backing to meet their responsibilities. During our Brandon Springs Outdoor Recreation Research Workshop, a BOR representative said the research environment was better, some funding for basic and applied studies was available, and more personnel had been given assignments in this important job.

Let us resolve here to help our BOR friends build on this mini beginning and to help them become the outdoor recreation research influence they should be.

Finally, lets take a look at the "Publish or perish" syndrome. More often than not research language and the paper, magazine or other medium selected isn't geared to the potential ground - grubbing user --; but it does give the researcher a continued lease on life.

Perhaps we need to shake the foundations of the "reward system" by rewarding researchers based on the amount and kind of substantive help they provide the practitioners. This would provide the environment for a real love-affair.

As you'd expect after all this friendly harassment, I have a few recommendations:

1. Make specific recommendations concerning use of your research. Recreation Research policy (when I was in the Forest Service) said the researcher would make his findings known. He would not make recommendations! Your products will never sell without your willingness to climb out on the limb with us.
2. With considerable sincerity learn as much as possible about your potential clientele. Court the managers and administrators and know if there's a difference.
3. Help us in all possible ways to move the BOR into a strong - highly respected role as National coordinator of Outdoor Recreation Research. Encourage them to move high caliber personnel into their research coordinating positions.
4. Move with vigor into the APPLIED research realm.
5. Help provide graduate students with useful - saleable study opportunities.
6. Don't use extension folks as your crutch in selling your findings.
7. Broaden your professional horizons by joining and helping promote viable recreation organizations. NRPA or one of its branches needs your help. You'll find a whole new real world of recreation managers there. My advice is to join a local state recreation and park society. The members will readily buy the useful "products" of fellow members.
8. Educators should consider forming a special research flavored organization under the umbrella of SPREE.
9. Court the leisure products community and user organizations. Researchers and managers have long been reluctant to move in this direction.
10. Don't talk about your "reward system" in mixed company. It's a red flag word series to most managers.

11. Additional emphasis must be denoted toward human development, well-being, and creating a positive self-immage. Time spent on trying to find the best grass to grow under picnic tables should be directed toward betterment of man's well being.
12. Next time you ask a manager to "tell it like it is" pick someone who doesn't know you so well!

A CRITIQUE OF THE PAPER ENTITLED

"THE MANAGER'S VIEWPOINT: RESEARCH AND APPLICABILITY OF RESULTS"

K. F. Schell[1/]

The one obvious, predominant conclusion, with which I agree, is that the relationships between researchers and managers must change to generate more mutual understanding. There are, however, some implied reasons for the existent relationships which I may not be able to support, e.g., researchers might be arrogant and look down on managers, and they complain about a poor reward system.

Another point of agreement, and one which merits considerable, serious discussion is the absence of recommendations in research reports. As indicated by Mr. Cottrell, U. S. Forest Service policy in the past has ruled against the inclusion of specific recommendations in a research report. Other research organizations have this same policy. Recommendations are assigned to the extension arm. Should this policy or procedure be changed?

Mr. Cottrell has presented us with a list of "introspective questions" which I think are excellent guidelines to our investigations of researcher-manager relationships. There perhaps could be some additions, but this list along with his 12 recommendations should suffice for the time available to discuss them at this workshop.

One additional point of agreement before posing some questions: the role suggested for the Bureau of Outdoor Recreation should be assigned high priority. This role is included in the original mandate for BOR by Congress and is necessary to an efficient and effective regional and national outdoor recreation research program. I suspect Mr. Cottrell will be challenged, I think he should be, on his implicit questioning of BOR's competence in evaluating research proposals. A worthwhile exercise might be to examine the proposal and the projects he refers to and have a determination by "some of this group" as to their similarity and the merit of the proposal. Such an approach gets very close to personalities, but this cost could be exceeded by the benefits of such a case study.

Returning to the subject of manager attitudes and reluctance to consider, accept, and implement research findings: I think we must recognize the fact that some managers and administrators do not welcome change regardless of the justification for change. Various reasons have been offered to explain this resistance to change including threats to security; increased work loads; and increased costs, both quantifiable and non-quantifiable, of transition.

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This leads us to the question of who will motivate managers to implement changes suggested by research. The researchers? It is unlikely that as a group they would accept this responsibility. They would, I think, support a planned effort involving other groups. For example, there is need for research to identify barriers to the implementation of policy changes suggested by research results.[2/]

I would propose that administrators and managers who have formal education in recreation are more likely than others to accept results of recreation research. Consider the analogy of a District Ranger of the USFS who has completed a forestry curriculum and accepts most research findings associated with silviculture. (I am not so naive as to think this is universally so.) I have observed that such persons are less receptive to the findings of social scientists involved in recreation research. The author of our subject paper claims zero (0) credits in recreation. However, he has had the equivalent of many such credits in other training programs, professional associations, etc., and can be considered a manager with outdoor recreation training. I suggest that we might find strong correlations between manager receptivity and the age or type of training of managers. I have heard other researchers imply that managers who do not seek out and analyze research results might not be qualified managers. I cannot argue strongly against this position.

Although it may not be appropriate to include the following in this critique, I offer it to insure that it might be given some consideration: during the last five years, public agencies and other organizations which have offered limited and no employment opportunities for young, natural resource managers who have recently completed their training, have created within their organization a serious education, age, and philosophy gap. They are forfeiting the benefit of improved education and training which has been developed by our institutions of learning.

Surely, I appreciate Mr. Cottrell's concern for the "actual needs" of managers. However, we cannot sacrifice our quest for more answers to the questions about carrying capacities and social benefits. Basic decisions about our resources, both land and people, and the resultant planning have a continuing need for such answers--and, for the present at least, a priority.

Very briefly, a point of correction and clarification: the term "rip-offs" used by Mr. Cottrell in his reference to overhead costs at academic institutions is not justified. I must remind him that the guideline for the level of overhead costs is determined by the Department of Health, Education, and Welfare. For the past few years the percentage has exceeded 70. This, however, applies only to those salary costs incurred at the institution, in

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[2/] Recent inquiries, associated with the preparation of this critique, with researchers in the disciplines of industrial management and sociology reveal that there is some published information about the acceptance and implementation of research findings. Hopefully the Extension Specialist's Viewpoint at this workshop will include some information on this point.

its offices or laboratories. At other locations the percentage is reduced to about 30. No overhead is charged against costs for travel, equipment, and supplies. Also, in some cases, at least at the University of Tennessee, no overhead or a reduced overhead charge is made. The elimination or reduction may be considered the institution's contribution to the research project.

In closing, I would add to Mr. Cottrell's list of recommendations. Perhaps just as important, or more so, for the researcher as getting to know the manager clientele is to know the recreation user clientele. Any researcher in a given recreation activity area should participate in or observe the activity. He should camp, hike, hunt, fish, ski, etc. There are multiple benefits to this procedure.

INTERRELATIONSHIPS OF RECREATION MANAGERS, EXTENSION SPECIALISTS AND RESEARCHERS

Dennis R. Crowe[1/]

Abstract.-- Southern Extension educators conclude that recreation research will be more fully used by resource managers when each of the management-research-Extension components function as a team. Teamwork demands mutual respect, agreement on goals and methods, cooperation, and communication. Often Extension recreation education must be basic, causing a significant lag in current research communication and application. However, greater Extension efficiency would result with a) expansion of responsive and relevant research, b) formal mechanisms for Extension-research collaboration, c) larger numbers of Extension specialists and researchers, d) expanded technical support of the county delivery system, and e) development of non-traditional, education-maximizing modes of delivery.

Effective management of natural resources for outdoor recreation must rely on cooperation between managers, researchers, and Extension recreation specialists. Southern Land Grant university recreation education specialists contend that several impeding obstacles must be removed to assure effective communication between managers and researchers and to obtain maximum benefit from research efforts. Needs focus on more relevant southern research; more conscious teamwork between researchers, managers, and Extension specialists; and changes in Land Grant university methods of rewarding faculty, funding short term research, and overcoming hindering agricultural Extension traditions. The situation is further compounded by the youthfulness of Extension recreation programs and the lingering imperative to communicate recreation educational basics to audiences caught in a major information time lag.

Before expanding on obstacles to communication, it is appropriate to examine a simple model of an idealized management system in which research application is maximized. The model focuses on roles played by individuals or groups who form a team concerned with sound recreation resource management. The role model (our goal) may then be compared with real situations to identify existing weaknesses, system disfunctions, and special problems needing attention in the South. From this discussion some means will be identified to strengthen the communication process and improve recreation resource management.

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IDEAL ROLES BETWEEN MANAGERS, RESEARCHERS, AND EXTENSION SPECIALISTS

The simplest resource management system is a manager or team of managers who are familiar with local problems and make decisions in the field. Their decisions may be enhanced by problem and solution comparisons with other managers. When complex situations prevail, a team member may be assigned exclusively to information gathering and maintaining contact with work done by other managers. Otherwise a consultant may be hired to gather and analyze existing information needed for making decisions.

Situations arise in which the collective experience of resource managers and their consultants cannot provide satisfactory information essential to problem solution. A third party, a researcher, may be asked to examine the problem and uncover relevant new knowledge. If the management team represents a large agency or firm, the researcher may be hired to develop a long term program of uncovering new information in support of management. Otherwise the researcher will be housed with a private research firm, a university, or a public research agency and temporarily contracted to perform needed applied research. In either situation the process of application is direct and is contingent only on quality and relevance of research results.

Often management situations are complicated by the necessity to take quick action. There is insufficient time to contract for research, wait for execution, wait even longer for results, and still have to evaluate the results for significance to solving the problems at issue. Hence, the manager relies on his ability to keep informed of current management practices and research that might be applicable to anticipated problems.

At this point, every manager is aware of the knowledge explosion that has transformed today's world. Having limited time to sift research results for relevant information (even if he knows where to look), he may give it up as a futile effort and rely on intuition or wait for relevant information to somehow filter to him.

Land Grant Extension and similar education programs are indispensible in speeding up the process of filtering new knowledge through the management system. Instead of waiting for new ideas to pass in devious ways to the eventual user, the Extension job is to keep informed of new knowledge in order to channel relevant information directly to the manager, to help him understand it, and to motivate him to action.

Thus one role of the Extension educator is to function as a direct conduit of new knowledge from the researcher to the manager. Since few managers have the time and some lack familiarity to digest technical reports, the Extension conduit role is compounded by an obligation to translate, abbreviate, and disseminate the knowledge to the appropriate manager and in an applicable form.

The Extension educator plays other roles also. On request, he may function as a consultant, to gather and help analyze facts needed by managers or planners. His primary objective is to increase effective use of known and new information. He also plays a critical role with the researcher by informing him of management-

relevant priority research needs, and collaborating on research formulation and design. All this requires continual communication between managers and Extension specialists, and between Extension specialists and researchers. A similar direct communications link is appropriate between managers and researchers.

It must be stressed that the Extension specialist is more than a two-way research translator and transmitter. He is an evaluator, organizer of fragmented results, and a synthesizor of research as he molds it into guidelines or other adaptable form. The Extension research communicator is more a research organizer, for his job often calls for reviewing conflicting, duplicative, and at times insignificant research in order to separate out a state or local problem-related package of research results and other knowledge. All this is in addition to a co-dominant role of innovator and motivator.

CURRENT RECREATION RESOURCE MANAGEMENT RESEARCH DISSEMINATION BY EXTENSION

Ideal roles of Extension with research and management can now be compared with the present southern situation in order to identify faulty roles. Because real situations are seldom ideal, there should be no indulging in self-flagellation for what may be perceived as failings by comparison to ideals of efficiency. Nevertheless, as a low scoring archer who simply aims at the target instead of the bull's eye, our scores may be higher if we critically evaluate our stance, the way we choose our target goals, and the time and method of our release. Furthermore, for score improvement beyond gains from self evaluation, there is no substitute for open and honest acceptance of critical suggestions by others who know how to play the same game.

Diversity is the rule for Extension outdoor recreation efforts in the South. Few situations are common to all states, resulting in variation in program content, educational subjects, and user audiences. However, it is probably true that throughout the South there is scarce application of current recreation resource management research through Extension efforts.

Most southern Land Grant universities have a state recreation specialist who provides leadership for statewide Extension educational programs in outdoor recreation. Seven of these fourteen university educators are located in community development or similar departments. The others are with school or departments of forestry, wildlife, or recreation. Many are housed in Extension departments separate from their resident instruction-research counterparts and may have less than desireable frequency of contact. Little programming time is available for many resource management topics because nearly all have heavy demands placed on them to provide consumer recreation educational programs and technical assistance related to development of local community recreation services. Community resource development and rural development committees are properly supported in most states. Often there is involvement with park and recreation board or tourist association formation and support, park acquisition and development, general recreation planning, and tourism development.

There typically is little involvement in recreation resource management beyond elementary land and water conservation considerations inherent in

establishing community parks and in advisory involvement in some county land use planning. Knowledge of some current recreation resource management research is vital for maintaining professional competency, but demands are quite low for application of this type of research in most community development work. Except on intensive demonstration projects, recreation resource research is seldom used.

In addition to the state recreation specialists there are about fifteen southern Extension forest resource specialists, most of whom are foresters, who have some involvement in recreation resources management research dissemination. Most of these are generalists who list recreation in combination with up to fifteen other forestry and conservation problem areas. Some help with nature trail design and similar forest recreation concerns, but current research dissemination usually involves forest management for other than recreational values. Of course, program emphasis varies from state to state.

In general, recreation research that has been applied through southern Extension efforts has tended to emphasize surveys of characteristics of successful enterprises, economic studies of various segments of the commercial recreation industry, and consumer surveys. In many instances Extension audience levels of recreation knowledge are so modest that educational efforts must be spent in increasing the effective use of common information.

Under these circumstances, basics tend to supersede more sophisticated current research results. Extension deals every day with an information time lag of major proportions. Youthfulness of Extension recreation programs and the necessity to serve all types of recreation information needs further limits the opportunity for the specialist to get below the surface of basic education. In such a climate state specialists can become generalists who have difficulty keeping up with research reading, much less digesting, reorganizing, and rewriting research in a form useful to managers and planners.

BARRIERS TO RESEARCH APPLICATION

Three complex, interrelated problems combine to hinder recreation research application in the South: 1) There is a paucity of relevant southern research; 2) Research, management, and Extension have failed to unite as a team; 3) The traditional Land Grant agricultural research and information system is poorly equipped to handle recreation resource topics. Responsibility for existence of these problems must be shouldered by all groups involved. Neither research, management, nor extension functions can be singly blamed for these barriers, and for some only time and failure to adjust is responsible.

Paucity of relevant research

Southern recreation Extension programs might have more responsive managerial audiences if their educational value were more easily comprehended. Extension has no real uniqueness when the information exchange is common or old knowledge. If undeniably relevant new research results were available through Extension, credibility and acceptance would be greatly enhanced. But, despite the huge volume of recreation writing and research results produced nationally during the last fifteen years, large unmet research needs continue in the South.

There is a glaring lack of research which is relevant to the South, to individual states, their localities, and especially their urban and exurban recreation resources.

Currently there is no ongoing U. S. Forest Service recreation research in the South. Other federal agencies with research capabilities also may have left the southern recreation scene, and very little was done in the past. It is very questionable that Pacific Northwest or northeastern research can be directly applied in the South and especially to Florida's urbanized, peninsular, near-tropical exception to many rules. As recent social concerns shifted to other matters of environmental quality, it would appear that Land Grant universities continued to place low priorities on funding recreation research. Consequently, southern universities lack the manpower and budget to pursue critical state and local research needed for planning and managing aesthetic and recreational resources in a rapidly urbanizing, land use conflict generating South.

With state and local planning, development, and management activities rapidly increasing and recreation research apparently decreasing, there arises an obvious dilemma. Need for the Extension recreation program has never been greater and is growing, yet overall program efficiency and production potential must drop. Research efforts must be expanded and more effective use must be made of existing knowledge. There simply are too few researchers, too little southern research, and too few Extension recreation specialists.

It may be proper to contrast management of local recreation and open space lands with large extensively managed recreation resources such as those managed by federal agencies. Seemingly little research is being provided the planners and managers of these local resources. Their problems differ by scale and use intensity. Management is largely reduced to site maintenance. There are lawns to mow, ditches to clear, roads to maintain, traffic accidents and emergencies to investigate and report, rowdy visitors to control, etc. The resource base beyond what is mowed is often left alone. The forest manages itself. Trails are maintained but high user impact trail-side forests are neglected.

Authority and, by default, concern for decisions in local park management encompass principally operations maintenance. Functionally these are park operations managers, not resource managers. The attention given the site is primarily that required to handle people and counter obvious major people impacts. The more subtle implications of resource management are lost in attention to the crush of visitors, personnel problems, and seeing that equipment is operable. Simultaneously planners continue to devise park allocation schemes based on recycled rules of thumb.

It seems that few local managers and planners are requesting research and even less research is performed. They say their problems are practical, not academic, and they don't seek help from the university. We don't even know which urban resource management needs are most critical because so little attention has been given these resources. Public relations ultimately may be more worrisome to state and local park managers than site resource management. A distinction must be made, however, between the problems faced by park superintendents and the policy makers and managers in main offices. For either group, genuine research is rare.

Failure of the team concept

Two basic failings emerge from an examination of the manager-Extension specialist-researcher team: 1) research-Extension relations function too independently and 2) research is too isolated from management problems.

Research-Extension relations.-- Basic to the Land Grant university system is a team approach between research and Extension, and this team must function if the job is to be done. Research and Extension are not independent functions of the university, despite implications of separate academic and Extension departments for a single discipline.

Resident instruction and research departments have long practiced a subtle snobbery and self-elevated separation from Extension. During the last century, the world at large has given greater status to the inventor or creator of knowledge than to the practitioner. It is a pity that persons who pride themselves in their grasp of the scientific method of logical reasoning have been so gullible as to associate this status with functional quality, causing some to withdraw into self-congratulating, behavior and attitude reinforcing circles. (In fairness, such group criticism must be taken only by the individual, as it applies.)

Partly resulting from this attitude is an assumption of one-way flow, and active-passive roles. Except for a modest amount of passive reverse flow whereby managers and Extension specialists communicate on problems and research needs, the researcher view is primarily of one-way flow: researcher to manager, perhaps through Extension, if application and dissemination is seriously considered. It is true that some more zealous applied researchers are honestly concerned with improving the effectiveness of transmitting current research findings to users, but again this is basically a one-way flow concept.

Formal researcher-Extension specialist communication over research is minimal. There may be an annual or less frequent opportunity for the Extension specialist to discuss priorities during review of research planning. Depending on physical proximity of working areas, there may be opportunity for informal discussion of research needs and applications. Failure or success in communicating and response depends most on the individual personalities involved and on the responsiveness of the system. Little formal structure or incentive encourages the researcher to transmit research to the Extension specialist. Some researchers may even avoid communication for fear of having their results described through Extension education efforts before a journal has accepted their work. The Extension specialist must look to many researchers for information to integrate and route to managers, yet it would appear that few researchers consider their team role seriously enough to send Extension specialists copies of reports or abstracts. Only fifty copies in direct mail would inform each state recreation program leader of major results. It is assumed that Extension has research results at disposal, but probably the specialist doesn't have all he should have.

Research process isolation.-- Managers and Extension specialists claim it is difficult to get many researchers into the field to see problems at first hand; hence some research tends to suffer from the isolated state in which it is conceived. The problem is dual: 1) research is not always on priority problems and 2) there is too little researcher anticipation of the most useful form of results.

The objectives of too few research studies are offered for review by representative users to ascertain their relevance. The researcher or the contracting agency assumes the form of anticipated results is proper, but the ultimate user may require a different form.

Agency designated and contracted research usually includes review of research design and form of anticipated results. However, some applied research formulation avoids a critical review of potential applicability, relying instead solely on researcher opinion. The argument is not for specific application as contrasted with general application, but for greater attention to appropriateness of research and form of results in order to maximize application potentials. This need exists since almost all research must be translated and specially adapted before application.

For example, assume research produced significant results useful to managing lands for different user group preferences, but in order to apply this knowledge, the manager must interview all visitors to find their position on a sophisticated psychological index curve. Had the researcher anticipated application, perhaps an index correlate could have been tested that would allow use of a simplified observation to class visitors in order to manage for group preferences.

Some of the responsibility for poorly applicable results rests with management, for there may be an unwarranted defensive posture or even a reverse snobbery in some instances that prevents manager-researcher communication. This may be demonstrated by managers whose attitudes are characterized by comments such as "Who needs research? It is too theoretical and unrelated to be of any value."

Responsibility may partly rest with the Extension specialist who fails to indirectly educate the researcher about team roles. A young teaching-research person once remarked to an Extension specialist on the same faculty: "What good are you to us? You don't teach classes. You don't do research. I really don't know what you do!" This candid and honest statement demonstrated ignorance of team roles and results of poor communication. The Extension specialist undertook a year-long job of educating the researcher through casual conversation, committee work, badgering him for research information, and demonstration of willingness to help him by reviewing his field interview schedules and research designs in the specialist's area of greatest research capability. One day the researcher conceded: "You know, all this time I thought you were just a guy who told people where to go fishing, but you really have knowledge of recreation resources and their users that is a credit to our School effort. Let's get together and write a joint research project statement."

The point of this illustration is that communication is a two-way street and sometimes the street signs should be re-read. To obtain better, more relevant research, and to have it applied, all parties must be a little more tolerant, more mutually respectful, and teamwork improvement must be actively sought.

In fairness to researchers, it must be pointed out that establishing a solid research base for applied efforts has been a difficult task. Recreation research is centered on a social problem area, and is not the domain of a

single discipline. Each discipline has struggled to evolve its own theory. Hence much work has been exploratory and basic with very fragmented applied research gains. It probably is accurate to say that some recreation research is properly too theoretical for managers to use. But managers must appreciate the reason for this and support both pure and applied research.

System inadequacies

Three Land Grant university system inadequacies deter application of research results: 1) The reward system is not designed for researcher-Extension specialist cooperation, 2) Experiment stations have difficulty performing needed recreation research, and 3) The traditional agricultural Extension system is not designed to aid recreation resources management.

Rewards for cooperation.-- Most research agencies make little pretense of response to research needs identified by Extension specialists. The Land Grant researcher must at least pay lip service to Extension suggestions but there is no mandate for cooperation as a team. Performance evaluation is based on teaching and published research. Time spent in the field is time taken from classes or research. Furthermore, budgets usually are not adequate for exploratory field work.

Research relevance is ultimately of little concern when promotion is considered. Importance is placed on acceptance of published research in peer journals. Slight incentive is offered to publish for management; instead, this takes time away from "serious" writing. This usually places the whole burden of cooperation on the Extension specialist.

Experiment station problems.-- Many Extension generated research needs are for short term studies. It is difficult to get research information in time to meet needs. Research planning usually is too involved and for too long a term to allow placing a researcher on the job when needed. Often studies of less than one year's duration are needed and for such periods most budgets won't allow researcher involvement except at some loss to ongoing efforts.

It appears that recreation research has been given low funding priority. Food and fiber concerns are still the primary concerns for agricultural experiment station research. Researchers may see needs for research, but there is seldom "loose" money for projects. Studies must be dove-tailed into appropriate ongoing long-term projects, if they can be found.

Agricultural Extension traditions.-- The reason for being of the Cooperative Extension Service is infusion of current university knowledge into the arteries of each state's working information system. The strength of Extension is the system of county offices throughout each state. The local information user has a campus of his Land Grant university in his county with university faculty to assist him.

However, few land use decision makers, planners, and renewable natural resource managers seek research or other information on other than agricultural matters from the local Extension office. The information and continuing education potential of the county office is publicly stereotyped with largely an agricultural subject identity and is internally limited by agricultural expertise and habit.

The problem is that natural resource management concerns other than agricultural are foreign to the training and philosophy of agricultural Extension faculty who staff the local offices. There simply are few at the local level of Extension who are effective in communicating natural resource management information (recreation, forestry, or wildlife).

Therefore, there is little reason to expect anything but a very weak delivery link between the university or state recreation specialist and the local resource manager. Though unfeasible to some, a major task of each state recreation specialist is to maximize the delivery system by encouraging and training the county staff. Most county staff usually respond to recreation information requests with a letter or call to the state specialist who handles the problem. For example, most vegetable crops Ph.D. or Masters degree holders prefer to deal with vegetable crops; thus, they often force the state and area specialists to function as "county recreation agents at large," not as true specialists serving a network of educators. The result is that state recreation specialists and area community development specialists may have little more than superficial ties with the county system. Also, little current research finds its way to managers directly through the county system.

The Land Grant system provides research for agriculture and an Extension delivery system for agricultural resource managers. Little formal support is provided for natural resource concerns which are peripheral to production agriculture. On the other hand, much research in wildlife, sport fisheries, and recreation is performed outside the traditional Land Grant agricultural research channels. U. S. Forest Service recreation research is funded externally to agricultural research, as is that of the Tennessee Valley Authority, Corps of Engineers, Bureau of Outdoor Recreation, Fish and Wildlife Service, etc. Other state and local agencies are sought by resource managers for their wildlife, forest and allied recreation resource research information needs.

In Florida, private consultants, the district conservationists of the Soil Conservation Service, the county and urban foresters of the Florida Division of Forestry, and the local management specialists of the Florida Game and Fresh Water Fish Commission are primary local sources of recreation resource management information. Each of these agencies is both a management and information delivery system, with its own internal channels of updating and continuing education of field personnel. Furthermore, typically when Land Grant university research and information is used by these agencies, it is without benefit of formal linkage through Extension.

With a few exceptions, most southern states have similar parallel agency systems of recreation resource information dissemination. The Extension dilemma lies in the reward system. For the state and area specialist to serve the parallel agency system is to by-pass the local Extension office and admit system failure. Since the specialist receives his reward from serving his system there is little personal incentive to divert his time and effort into the higher efficiency recreation delivery system.

RECOMMENDATIONS

In conclusion, a number of positive steps need to be taken in order to overcome the obstacles discussed. The following outline lists several possible partial solutions to the problems at hand. Not all of these fit each southern state, but it is intended that these recommendations serve as a catalyst for finding ways to improve recreation research application in the South.

Research improvement

Expansion.

Support renewal of southern recreation research by the U. S. Forest Service and other federal agencies.

Support development of recreation research staff in southern Land Grant institutions.

Increase regional, state and local research, especially that with urban orientation and regional planning application.

Responsiveness - flexibility.

Explore ways to fund short-term recreation research, perhaps by inventing a new support project category to include an array of studies.

Seek efficient ways to allow short-term transfer of Extension or research assignments and budgets.

Relevance.

Increase research and operating expense budgets and time flexibility to allow more exploratory work and field study of manager problems.

Establish formal requirements that all applied research plans be subject to manager-user review.

Encourage researchers to anticipate and accommodate operational use of applied results, with particular attention to organization of research design for ease of result application.

Researchers should be encouraged and rewarded for efforts to publish and otherwise communicate results to users.

Joint research-Extension appointments are needed.

Research-Extension team improvement

Manditory measures must assure formal and functional cooperation between members of the research-Extension team.

All channels must be opened to increase two-way communication between research and Extension.

Joint Extension-research appointments should be increased to dissolve certain superficial distinctions between functional roles.

Extension and research groups should be co-located with budgetary and program functions under common administrative control.

Extension specialists must continue to improve informal educational programs for researchers to impart better understanding of joint roles.

Based on user requirements of the management-Extension-research team, a centralized national and regional recreation research monitoring and coordinating agency is needed. An outgrowth would be a readily available management information retrieval system.

Extension improvement

Manpower.

Each southern Land Grant university should have at least two state recreation specialists: a resource specialist and a community development specialist.

Area recreation specialists are needed to work with managers, developers, and communities.

Expansion of student assistant and technician support budgets should be considered to help stretch extension specialists' capabilities.

Administrators should continue to upgrade research communication by continuing to hire specialists having research capabilities as well as educator qualifications.

County support.

State specialists must place increased emphasis on in-service training to improve county capabilities and maximize efficiency of the statewide information delivery and educational system.

A better job must be done of supporting local offices with current usable research information and publicizing the information and its local availability. (This should increase visibility, credibility, and image of the system.)

Conscientious adherence to a planned program of work will allow less county fire-fighting and more profitable attention to research application efforts and building county capabilities.

Research communication

Extension must undertake research on its effectiveness in recreation research communication and aiding application.

An Extension administered program is needed to build manager understanding of values of and enlist support for long-range, large-scale, basic recreation research.

Regional recreation Extension communications are needed. Focus should be on cooperative program development, evaluation, publication, and data sharing. An automatic report-activity-abstract sharing system is needed.

Extension must formally address the need for audience expansion within non-traditional channels. Support communications links should be established with agencies having local delivery systems now used by recreation resource management professionals.

Extension recreation efforts might benefit from a de-emphasis on information delivery services in order to capitalize on the educational role of the university. Especially needed are intensive courses and other means of aiding in vital continuing education of competent resource professionals.

A CRITIQUE OF THE PAPER ENTITLED "INTERRELATIONSHIPS OF RECREATION MANAGERS, EXTENSION SPECIALISTS, AND RESEARCHERS"

L. A. Lindquist[1/]

Dennis Crowe's discussion of interrelationships between the three roles proceeds in a logical manner and presents a very clear analysis of the state-of-the-art. The paper does not disclose any new research, but describes the situation with emphasis on the author's personal experience as an Extension Specialist with a Land Grant university. From this somewhat limited standpoint, the paper is thorough and comprehensive.

An idealized management system in which research application would be maximized is described. In this system the Extension educator is seen not only as the conduit for new knowledge, but as having the obligation to translate, abbreviate, and disseminate knowledge; to gather and help analyze facts needed by managers; to collaborate in research formulation and design; to identify relevant research needs; to synthesize research by organizing fragmented results; and to serve in the role of innovator and motivator. This looks like a very heavy responsibility. We can see many of these functions in our conception of extension, but believe that most of them are shared by both the researcher and the manager as well. Research cannot be relevant and useful if the Extension specialist is the only one who can tie it to the real world.

Crowe seems to feel that the southern situation is unique with regard to diversity of programs and situations, and that the traditional extension system designed for disseminating agricultural information can't cope with recreation resource topics. In our experience these comments could apply equally in other sections of the country and do not need to be qualified as being uniquely southern.

We agree that County Extension Agents are seldom oriented to disseminate recreation research but feel that his weakness is no less applicable to other areas of knowledge which Land Grant universities might be able to disseminate. How do miners, social workers, and bankers keep up-to-date? Surely not through the County Agent. We like to view extension (small "e") as a process, rather than as a role, which fits into every discipline where new knowledge is being defined. In some areas this process can be internal, such as within a State or Federal agency, where a new system may be developed, adopted and then disseminated to managers and field workers. In most such cases there is an educational process involving all of the characteristics of extension work.

The author does not mention the many external extension-type programs involving recreation resource topics other than those conducted by Land Grant universities. Comprehensive lists of these have been published[2/] by the

[1/]Forest Supervisor, Caribbean National Forest and State and Private Forestry Program, Rio Piedras, Puerto Rico.

[2/]U.S. Department of the Interior, Bureau of Outdoor Recreation. 1970. Federal assistance in outdoor recreation. Publication No. 1, Revised 1970, and U.S. Department of the Interior, Bureau of Outdoor Recreation. 1970. Private assistance in outdoor recreation, Washington, D.C.

Bureau of Outdoor Recreation. One example of extension-type assistance in the recreation field is the Park Practice Program, which is a joint program by the National Park Service, the National Conference on State Parks, and the National Recreation and Parks Association. This program consists primarily of publications dealing with a range of planning and policy concepts and field maintenance methods. This kind of "extension" vehicle can serve to transmit all kinds of ideas, including interpretation of research results.

We particularly liked Crowe's analysis of the barriers to research application, and the listing of recommendations intended to overcome the obstacles discussed. He has successfully identified the significant broad areas where successful changes might be made to improve the dissemination of recreation knowledge. This discussion tends to have the same limitations mentioned above, however, because of the author's constraint of the extension role to the Land Grant University. Of the problems listed, we only question the first in his list, which discusses the paucity of relevant research. It is true that there is not a great deal of research presently going on in the South, but most of the research we have seen which involves new methods is applicable very broadly. Where empirical data are the sole research result, the conclusions, naturally, are confined to the area where the data originated. We don't think this is the case, or at least are not convinced, when the author does not cite any specific examples.

We're not sure that not having hot new items to pass out is a true limitation either. Recreation is a field of considerable growth, and there are new areas and new managers needing some exposure to older ideas. At many levels, these people have been assigned to the recreation resource field from other disciplines and are in need of basic training using material from existing research literature. Most studies in recreation problems are not yet a full generation old, and there is plenty of disseminating to be done among those of us who have not yet gotten the word on basics.

We'd like to see more examples to support some of the generalizations by the author, such as:

"Diversity is the rule for Extension outdoor recreation efforts in the South."
"...recreation resource research is seldom used."
"...large unmet research needs continue in the South."
"...few researchers consider their team role seriously enough to send Extension specialists copies of reports."
"...some applied research formulation avoids a critical review of potential applicability."

It's possible that examples could have helped the author to remove many of the qualifiers in his statements, thereby giving them more strength.

RELATING RECREATION RESEARCH TO MANAGEMENT DECISIONS

Kenneth D. Ware[1/]

Abstract.--There are well-known difficulties in doing directly applicable research, communicating research results, and in applying research results in practice. Some of these difficulties stem from unclear specifications of the roles of managers, extension specialists and researchers. Additional difficulties stem from lack of a common framework for discussing management decision, how information is ideally used in management, and, hence, the role of research in providing information useful in management. Management science provides an appropriate framework. This framework provides a basis for assessing the current state of the difficulties in recreation resources management and research and for exploring some general possibilities for improving the relationship.

Additional keywords: Researcher's role, decision framework, information needs, research and development, management by objectives.

INTRODUCTION

"It is worth remembering that the only real source of power in the world is the gap between what is and what might be. Why else do men work and save and plan?"

John Rader Platt

In this paper the emphasis is on management of the natural resources and the related "delivery systems" that are the focus, environment, and means for providing outdoor recreation opportunities and hence human benefits. Hopefully it will be possible, by emphasizing the human benefits to be produced, to avoid potential criticism of either narrowness or bio-centricity, and by emphasizing the management of the resources as contrasted with the delivery system (i.e., "managing" the people who come to reap the benefits) perhaps the author can stay closer to his area of expertise. (This is not to de-emphasize the problems or opportunities in these other aspects, some of which are to be addressed in other papers here.) An example of a question that relates not only to the resource system but to the whole delivery system is: What is the output that we should manage for and measure when we manage wildlife habitats? Until we have specified our objective in providing satisfying outdoor recreation experiences for hunters and outdoor recreationists whose use of wildlife is non-consumptive, we cannot even decide how to measure our output from the resource system, or specify ways to evaluate our performance in cost-effectively satisfying the objectives. Here, let us for the moment, however, rest these weighty questions while we concentrate on a framework within which we may do more relevant research to provide useful answers.

Although roles of managers, extension specialists and researchers have been discussed in earlier papers by Cottrell and Crowe in these Proceedings, there seems still the likelihood that we do not all have similar ideas about either what is, or what should be the roles. If we had a clearer definition

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of what the whole job of resources management is, it might help us to decide which parts of the job are best left to managers, to extension specialists and to researchers. We do all agree that there is need to share the burden and avoid the "we-they" syndrome.

Whatever the decision problem is, it is usually relatively undefined and poorly understood by those concerned. What information is needed to solve the problem is far from clear and certainly there is little basis for setting priorities on the gathering of information whether the manager, extension educator, or researcher is to gather it. In fact, many management decision processes seem to be developed to be information independent, and the decision would not be influenced one way or the other even if much more information were available. (This may be appropriate, but it does not fit the value set of most researchers.) Suppose we all agree to work in absolute sincerity to try to define the research most relevant to application. What would we do? Do we agree? How would we cope with the variation among managers? Among uses of the same information? Among expertise areas of researchers? How would we arrange to satisfy need for fundamental and futuristic research?

Clearer communication and operationally useful definitions of roles and responsibilities should be possible if we accept a systems-analytic or management science framework for resources management. This is not a new idea and is a modest proposal. However, it might be useful to sketch it in this context.

We want to consider how to use or manage lands so as to achieve some objectives, e.g., producing services, environmental amenities, outdoor-recreation opportunities, raw materials, etc. Management of land for any of the products or services that people desire from it involves a complex biological, physical, and social system. As we all know, various uses of the land and resources are usually not entirely complementary or compatible; they are often conflicting. This drastically complicates land-use planning and land and resources management because, at the very least, the manager must predict the effects of alternative mixes of natural and managerial inputs on the production of each resource, or on provision of amenities or other values. Then, based on these predictions, and an appropriate decision or optimality criterion, he must decide on a "best" input mix. To do this scientifically he must have an adequate quantitative model of the forest system: that is, he must have a set of relationships permitting:

(1) prediction,
(2) determination of optimum input mix, and
(3) control of output through manipulation of managerial inputs.

This is, of course, true of any system providing outdoor recreation services, regardless whether the context is a multiple-use forest, one with emphasis on natural resources or a quite different one such as a park playground.

A FRAMEWORK FOR INFORMATION GATHERING AND USE

The Management Decision Problem

One relatively complete framework for viewing forest-resources management as a set of decision problems is described in the book "Planning Research for

Resource Decisions".[2/] (This paper borrows heavily from that book.) The framework is essentially that of management science, or operations research, and is closely related to classical scientific method.

This framework built around the idea of a "management decision problem", provides one construct for considering how research activities ought to relate to planning and management activities. People have resources planning or management decision problems when they are considering using resources to achieve their objectives, and when they seek to choose from a set of alternatives the most appropriate action to achieve that objective.

Specifying the problem.--A management decision problem exists and is fully specified when the following are identified and/or defined:

1. The decision-maker -- the person or group who has the problem.
2. The decision-maker's objective -- the desired outcome or output. The objective may be dollar income, or recreational satisfactions from a specific cash outlay, specified physical outputs from the resource system, etc.
3. Managerial alternatives -- at least two unequally efficient courses of action (specific sets of managerial inputs) which have some chance of yielding the desired objective, and doubt as to which choice is best.
4. The decision environment -- the context of the problem, external or uncontrolled factors that affect the solution. (These contextual factors may constrain the alternatives, influence the output, or influence the choice of optimality criterion.)

Information in problem solving.--The general objective of a land, natural resource, or recreation services manager is usually to supply that information which will contribute most toward helping landowners, or decision-makers representing them, to achieve their objectives efficiently.[3/] When the decision problem has been carefully analyzed, it becomes clear what information is necessary to solve the problem. To "solve the decision problem" is to choose the alternative that will most efficiently satisfy the objective. This is also the "optimization problem". It involves applying an "optimality criterion" (sometimes inherent in the statement of objective, e.g., obtain maximum) via an "optimization technique" to determine the "most efficient".

If we are to apply scientific methods to solve such decision problems directly, then we require a decision model. (Commonly the model will not permit complete direct solution but will incorporate only some of the most important aspects of the decision problem.) A decision model, in standard format, contains an "objective function" that relates levels of outcome (the objective) to the alternative levels of inputs--both those inputs under managerial control and those uncontrollable but part of the "environment". Functions that

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2/ Stoltenberg, C. H., K. D. Ware, R. J. Marty, Robert D. Wray and J. D. Wellons. Planning Research for Resource Decisions. Iowa State University Press, Ames, Iowa. 1970.

3/ The resources manager will sometimes be the decision-maker by proxy for the owners of the resources. There will always be some decisions delegated in the hierarchy. However, we find it useful, for purposes that will be explained later, to speak of decisions at a single level and with a single final decision-maker who is the owner of the resources.

specify any constraints or boundary conditions on the outcomes, inputs, or relationships between them are also required. Constraints determine the boundary between the set of alternatives specified as available to the decision-maker and related aspects of the context that are not to be considered as alternatives in the particular decision problem. (Such boundaries may be between decision levels in the organizational hierarchy.)

Then a "measure of performance" or "optimality criterion" is required by which the value of a decision, i.e., outcome associated with a particular alternative, is judged. This specifies what is considered optimum, "best" or "most efficient". Finally, one needs an "optimization technique" by which to determine what alternative is "best", i.e., what produces the "highest value" outcome. It is understood, of course, that the decision-maker will apply his judgment in taking the decision based on the always imperfect model and analysis. That is to say that the model and analysis aid decisions rather than make decisions.

Information flow.--We all recognize that there are many difficult-to-fulfill information needs in planning and management of lands for provision of recreation opportunities. For example, one may ask, "How can we possibly achieve satisfactory forest land management if we do not know how alternative land treatments regimes will affect levels of forest-user recreation, general environmental quality, quality of recreation-visitor satisfaction, timber growing-stock levels, soil and water quality, and wildlife habitat and populations". These kinds of information need come under what we refer to as response models or relationships, estimators for prediction of output, or production functions. These are the functions that relate output to input, and ideally, optimization techniques are applied to these functions to determine the "best" schedule of inputs. A common objective of research studies is to derive these relationships.

Role of Managers

In discussing research and management of wildland resources it is necessary to remind ourselves that we are speaking ultimately about the wants and needs of people. It is perhaps not necessary to remind outdoor recreation managers and researchers of that--your focus has been more on peoples' wants. Nevertheless, there may be danger of focusing on short-run wants. So let us be reminded that when many human wants can be satsified more effectively by using recreation resources than by using other means, then recreation resources assume greater value. But when there are other ways to satisfy peoples' needs more efficiently, the importance of recreation diminishes. This relationship is important because it clearly shows recreation resource management to be a means to various ends rather than an end in itself. The relationship appropriately places the focus on the persons to be served and on the wants to be satisfied by recreation resources management.

The critical importance of efficient management also becomes obvious. And it is indeed because efficiency is so important that we have resource managers. The ability of outdoor recreation managers to help satisfy human desires efficiently determines the proportion of capital and human resources that will be spent on outdoor recreation rather than on other activities which could also satisfy some of the same human desires.

Thus, as the manager learns new uses for his resource, he will be making

a greater contribution to society. Simultaneously he will be making that resource more valuable and as he makes management operations more efficient, he will again be increasing his contribution to society.

In performing his professional activities, the recreation manager assists his clients in four major ways:

1) First, he will help them identify and clarify their objectives. For example, the manager may help identify the various personal satisfactions that the owner is seeking in managing his land.
2) Second, the manager identifies for the client the various alternative ways of achieving the client's objectives.
3) Third, he helps his client evaluate or compare these alternatives, i.e, he helps him select the most promising or most efficient opportunities for achieving his objectives.
4) And, fourth, the manager usually supervises the subsequent activities to implement these decisions.

In other words, the recreation resources manager is a professional consultant who helps his client identify and solve recreation resource problems, or who himself acts in proxy to take the decision for his client.4/

Recreation managers frequently spend so much time implementing decisions that insufficient emphasis is given to problem solving, that is, to the critically important phases leading to the decision to undertake particular activities. This is unfortunate because it is when he is helping his client to make decisions that the recreation resource manager is often making his most valuable and typically professional contribution. Similarly, his greatest contributions in supervising management practices are made in the problem-solving or decision-making role.

Role of Extension Specialists

In the classical model, information needs and requests flow from managers outside of research; through education and extension specialists or applied researchers to the more applied studies; and finally to the more basic studies. Continuous communication between client and manager, practitioner and researcher, and among various kinds of researchers is necessary if both management and

4/ There is some risk of communication difficulties from our particular uses of the terms client, manager and consultant. However, it has been found desirable to describe the professional role this way as a reminder to ourselves as professional resources managers, extension specialists and research scientists, not to substitute our personal or professional objectives for those of the owners of the resources, whether public or private. This seems to happen frequently and it is important to minimize the risks. Usage here is in accord with the role of the professions--law and medicine. There the professional is clearly a consultant, even though after diagnosis he may exercise nearly complete freedom as a proxy decision-maker in administering legal defense or medical treatment.

Furthermore we have found it useful to consider a hierarchy of decision-levels, decision-problems and decision-makers and, a similar related hierarchy of researchers. In this framework then a manager or research worker can identify clients at higher levels in the structure, even if he does not relate directly to the final manager's client, the owners of the resources.

research efforts are to be most effective.

Communication and understanding is usually lacking between researchers and managers. The manager often fails to communicate his information needs to researchers because he doesn't understand what types of information that research can provide; and researchers frequently don't seem to provide the information that is most urgently needed to help managers gain greater benefits from the resources for their clients--perhaps because researchers don't understand the client's objectives or management alternatives. Unfortunately, increased specialization among researchers has aggravated this difficulty. For this reason, interest in strengthening the educational function that could bridge this gap is increasing, regardless of whether this function is to be performed by professors, extension foresters, applied researchers, articulate managers, or whomever.

This is the most important traditional function of the extension specialist. He serves as the necessary educator, innovator, information integrator, and communication channel. Informed about current difficulties in both management and research, he is an information broker who contributes to both management and research when he emphasizes the most important aspects of his role. His role in bringing technical innovations into practical application through community dynamics has been carefully studied by sociologists. Hence a great deal is known about how to work with innovators and community leaders to introduce the results of research.

Role of Recreation Research Scientists

Recreation resource science and scientists are valuable to society for the same reasons that the resources and their managers are valuable--they can help satisfy peoples' wants. Just as the resource manager's contribution is measured by how effectively he helps others to satisfy their wants efficiently, the productive value of recreation resource scientists must ultimately be determined by how much their efforts increase the efficiency of the manager.

This, then, indicates the purpose of research. One major purpose is to develop new alternatives for the resource manager. These may be new practices, tools, and concepts, or new products and services. A second common purpose of resource research is to answer questions of fact that arise during management. And inasmuch as resource management is viewed as the process of solving client's resource problems, these answers would be the information needed to solve these problems. That is, research provides the information needed to define or compare alternative means for achieving a resource user's or owner's objectives. A third purpose is to answer questions of fact that arise during research since it is only after some of these basic questions have been satisfactorily answered that the first two objectives can be achieved most effitiently.

Most resource researchers do not directly provide information for the resource manager. And though some researchers may be helpful in specifying the decision-problem and the information needs, managerial problem-solving is not their expertise or responsibility. Many researchers provide information to solve other researchers' problems. Resource research may be viewed as a continuous spectrum of scientists with the resource manager at one end of the continuum. The manager is principally concerned with his client's problem, that of the resource owner or user. But when he lacks the information needed to help evaluate the client's alternative resource practices, he may experiment with several of those practices. Next on the spectrum are the extension

specialists and scientists who are attempting to answer the managers' immediate questions of fact, such as resource-use trends, prices, and technologies. (Note that it is common for the extension specialist to deal directly with the landowner client, rather than with a resources manager who serves the client. This tends to cast the extension specialist more in the role of manager--with attendant risks. Some improvement might be made by more clearly defining roles in this area.)

Following the extension specialists and applied scientists are the developmental researchers who create new alternatives for the manager, particularly alternatives that will help solve problems not only of tomorrow but of years to come. Further along this research spectrum are scientists who serve a clientele of other researchers. These scientists, usually from the basic disciplines, provide the facts and relationships needed by other scientists who conduct the more "applied" developmental research. The relationship between applied and basic research is central to the history and philosophy of science and technology but we shall not explore it further here.

Although the ultimate client for all resource activities is the resource-manager's client, the public or private owner of the resources, the immediate clientele of a researcher may be managers or other researchers. But every productive researcher has a clientele to whom he provides research results. This clientele uses his results to solve their resource-management, or research, problems. When the client is another researcher, he in turn is able to conduct his research more efficiently and then provide his clientele with improved answers to help solve their resource-management research or practice problems.

As the distance on the spectrum increases between the manager and any researcher, successful problem anticipation, and hence planning, become more difficult. Although a scientist focuses primarily on his immediate client, his most basic research is really ultimately intended to help solve a resource-management problem. The research planner needs to anticipate that problem accurately. Thus researchers in the basic resource sciences are helping to solve important problems and grasp important opportunities not expected to be critical for 5, 10, or even 20 years. This scientist may have great difficulty in anticipating the correct problem, and on these questions it is not possible to get much assistance from managers who must, quite correctly, concentrate on local and current difficulties and technologies. This is one of the main reasons our society has encouraged extreme specialization, basic research and independent sheltered research environments. This, of course, has obvious and much discussed risks, not the least of which is that even though the problem may be anticipated, attempts to communicate about and possibly alleviate it may not be effective. The "energy crisis" is a large-scale current case in point. Researchers in the energy related sciences were saying 20 years ago that the problem would become a crisis, but the communications were ineffective, partly because the information was not at that time useful in solving anyone's immediate problem.

COMMUNICATION AND APPLICATION OF RESEARCH RESULTS

Let us "rap" about our common dilemma--the difficulties researchers have communicating research results, and the difficulties that managers have of applying the results.

As Things Now Are (Or Why We All Behave So Rationally)

Sincere interest in each others's difficulties, expertise, and values, and regular communication about the difficulties of each of us is a necessary first step as earlier speakers have said. However, just being communicative and sympathetic buddies will not, I believe, be nearly enough. And neither will a one-on-one friendly manager with friendly researcher arrangement. There are too many problems, too few researchers, too little money, too frail humans, etc. We are going to have to work together in some common framework and arrangements different than we now have to make much headway. Both managers and researchers have important jobs that take all of their time and energy, and just working harder at it won't suffice.

Permit me to use a personal reference to illustrate. I have a regular and candid communication with a number of resources managers who are personal friends--one is even my brother. These acquaintances do not find my research, or any research, very directly useful, I'm afraid. This is probably neither because the research is necessarily very bad or generally irrelevant, nor because these are poor or atypical managers. On even the most rudimentary analysis, most of their activities and the decision problems they have to solve do not require information of the kind that research can provide. The objectives, policy, and budget constraints of their employers and the nature of both their supervisors and subordinates cause their decision problems to be relatively restricted in alternatives and most decisions not to involve resources information.

If we reflect on our own decision problems we will find that we are not so different. Our problems contain relatively little common information need. This means, however, that it is especially important for us as managers and researchers to find what is common and what has high priority. The professional orientation and decision framework has helped me a great deal in discussing these difficulties both with researchers and managers. It enables a somewhat more realistic and objective understanding of the difficulties of knowledge acquisition and utilization. Otherwise researchers and managers enter the conversation assuming irrational behavior of each other. It is not difficult to describe a construct by which the behavior of both is seen as internally rational--whether or not there is any rationale for relating research to management. Although the supposed irrationalities have been much discussed, not much useful behavior modification has followed--often entrenchment at the poles has resulted.

The reasons for poor communication between researchers and resource managers are not obscure. Most resource scientists are specialists, often working in the basic sciences rather than in applied research. Most of these scientists orient primarily toward their scientific specialty and a clientele of other basic researchers rather than toward practical problems. Unfortunately, this clientele of other researchers is also serving a clientele of basic scientists, thus forming a closed circle of communication, a circle that includes neither the applied scientist nor the recreation resource manager.

Then, too, the work of the basic scientist, because it is specialized, appears narrow to the manager. In fact, it has often, quite properly, no direct utility to managers. In the 1960's more and more researchers oriented toward science rather than practice, and, therefore, their contributions to knowledge may not have direct application to practice. The communications

"chaos in the brickyard" by making bricks that cannot be built into any edifice). Similarly there are managers who "fly-entirely-by-the-seat-of-the-pants", seldom use or require information, and do not want to be "confused by the facts", to say nothing of considering conceptual foundations.

If a scientist answers such a manager's question for which the manager expects some simple factual or yes or no answer with a logical explanation of why the answer must be thus and so, the manager is turned-off. He is likely to think, "I didn't want a lecture, I just want to know the answer". The research scientist places higher value on the general approach to deriving and understanding answers. He assumes that with this knowledge, the manager might next time perhaps recall or even think through the answer. The scientist's reaction is almost to say "Well, if that fact is all you want to know, here's the textbook, dictionary or encyclopedia". Scientists and managers value different approaches to solving problems. Scientists would perhaps be poor managers unless they changed their values and vice versa for managers who would think "getting the answer" a more practical approach to research. We all need to recognize these differences in values and style. They may be important to nurture rather than to erase--though we tend to talk as if not just the differences due to specializations, but also the value differences should be erased so as to solve our communication difficulty and be more effective in bringing research to bear in practice. I do not believe it is possible, even if it were desirable, to erase these differences in subcultures. There are good reasons for the University and research organizations being somewhat independent of day-to-day brush fires. This, of course, should not be taken as license to be irrelevant--but it is often difficult to see what is truly most relevant.

Perhaps the management decision problem framework should help us to defuse the personal-value confrontations and to work together in logical problem-solving mode to attempt to specify just what the problem is and to decide just how we, each with our various responsibilities values and expertise, can best work together toward solving it. (This would not supplant, but would augment, the kind of personal sharing and communication discussed by the previous speakers.) Hopefully, by putting the problem "up on the wall" and setting our mutual objective to specify and solve it, we could at least avoid the wasted energy and negative reenforcement of calling each other unprintable names.

As We Would Like Things To Be

The necessity (and difficulty) of coordinating the efforts of researchers is obvious if an efficient and successful attack on the most important management problems is to be made. When several types of information are needed to solve a problem, failure to obtain just one bit of information may prevent solving the problem, and thus waste the research efforts invested in obtaining the other information. If communication and coordination are effective, managers will be continuously provided with better information to help their clients gain greater benefits from natural resources. With various degrees of success, the needed coordination is achieved in several ways, a few of which will be mentioned to show the diversity of patterns.

When a large amount of research effort can be concentrated on the solution of a particular problem, the problem itself may form the framework for a large research project. The project in turn would be composed of closely coor-

dinated individual studies designed to provide most of the facts or information required to solve the problem. These efforts might be coordinated by a specific project plan that is designed, studied, and agreed upon by all of the researchers involved. Or coordination might be sought simply by developing exceptionally effective communication and close cooperation among the various researchers.

Close cooperation among researchers within the same discipline is also frequently required. For example, several recreation researchers might be working on different facets of the same problem. Each scientist will contribute an important link of information that will be needed to solve the particular problem with which they all are concerned.

Thus, although the diversity in the techniques and forms of natural resources research is great, important relationships among researchers can be derived from the problem they are seeking to help solve. And because of these relationships there is a unifying pattern to the research activities as a whole.

With the complexity of resources management problems, shortages of research funds, and other difficulties we have already discussed, it becomes increasingly necessary to consider new arrangements for shared responsibility among managers, extension specialists, and research. One current approach to the solution of major decision problems that require the skill and judgment of the manager to be augmented by the expertise and outlook of the research scientist is to form specific ad hoc problem-solving teams. Then, following a "management by objectives" format such as described here, the problem is defined, the team's role in solving it is specified so that team members share responsibility for solving it and all have a stake in the outcome, and work proceeds. In this approach it may not be possible to initiate new research, but it is likely that previously developed results can be brought to bear. It is also likely that there will be indications of what kinds of research should be started to help solve similar future problems. An important benefit of such an approach is that not only are the value differences between manager and researcher brought to bear on a task with common purpose but true communication is necessary and natural to the functioning of the team in satisfying its goals. The Forest Service, and no doubt other organizations represented here, are using such approaches with some success.

There are other approaches to sharing the problem solving responsibility and to closing the gap between research and practice. These are being more often used in large industrial and governmental organizations and have become a part of the current literature on management. Suffice it to say here that we need to be more innovative in testing these arrangements for sharing responsibility in recreation resources management and research.

A CRITIQUE OF THE PAPER ENTITLED "RELATING RECREATION RESEARCH TO MANAGEMENT DECISIONS"

Allan J. Worms [1/]

"Blame where you must, be candid where you can,
and be each critic the good-natured man."
Robert Burns

Critique of a worthy effort becomes an especially demanding task when the critiquer seeks to enhance the meaningfulness and utility of that effort rather than to merely illuminate its faults. Mr. Ware's presentation is a diligent effort by a researcher to shed light on the conceptual and functional framework in which research may be related to management. Consequently, through analysis of a researcher's presentation, this critique will seek to contribute to solution of the fundamental problem, namely that of improving the application of recreation research for management decision making.

The title of "relating recreation research to management decisions" suggests a content which deals simply with applying research efforts to the character of recreation management problems. However the task before Mr. Ware was in fact much more complex than merely describing the techniques for research-based problem solving. Rather, it deals with the whole system of human, political, and disciplinary infra-structure giving rise to the dual processes of research and management. His assignment involved recognizing that research and researchers function differently and often quite separately from management and managers, even though both groups and both processes ultimately share the same objective. That objective, declared at the outset of Mr. Ware's paper, is "management of the natural resources and the related 'delivery systems' that are the focus, environment, and means for providing outdoor recreation opportunities and human benefits.

With this perspective, I fully agree for we are dealing very much in the sense of research for the purpose of its' optimum application by management and managers. Moreover, the end point, measureable or not, must be an objective of human benefit.

Early in his presentation Mr. Ware points out the need for definition of the "whole job of resources management" and that such an explanation might help us decide who should do what, on "which parts of the job are best left to managers, to extension specialists and to researchers." Within the next several paragraphs he very adequately sets the stage for a framework of information gathering and use. He describes the need for management problem definition, evaluation of management program input (1, prediction; 2, determination of optimum input mix; 3, control of output through manipulation of

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managerial inputs), and finally specification of the problem. All of this framework, however seems couched in terms of management problem definition by and for managers. At no point is there a definition or framework allowing researchers to come to grips with the management problem, and readily understand it as a researchable problem.

I suspect that just as managers and researchers exist in very different worlds of day to day operation, there also exists two very different lines of communication pertinent to their respective fields of operation. In short, I feel this paper has ably identified the perspective of research application and has established a conceptual framework for problem specification for the manager, but has not provided for derivation of the research problem in researcher terms which would enhance the potential for accurate research and its' ensuing application. In an earlier presentation by Crowe, it was noted a basic failing of the manager-extension specialist-researcher team is that research is isolated from management problems and that the "researcher view is primarily of one-way flow; research to manager, perhaps through extension." The building blocks upon which the reverse flow may be achieved are still lacking.

Ware's discussion of the role of managers raises several issues which may be disturbing to managers and which may mislead our appraisal of the importance of the management task. To paraphrase, he sets the priority of management in a perspective of "efficiently" meeting peoples' needs in the absence of "other" satisfactions.

A concern with this hypothesis is that other satisfactions may be directly exchangeable for recreation needs or opportunities. Unfortunately Ware does not define or describe these "other ways to satisfy peoples' needs." From the viewpoint of the manager of natural resources, resource facilities, or recreation enterprises, demand may indeed diminish during short or long term periods and for diverse reasons. However, this concept relates to resources, resource places or resource conditions, but not in a direct sense to recreation need or opportunity. The professional recreation manager will be quick to point out that need (or expressed demand) for recreation is one matter and user demand for recreation opportunity in a resource setting is quite a different matter. Thus, while management of resources may be a "means to various ends," management (and provision) of recreation opportunity and satisfaction of needs as an end does not necessarily subside coincidentally with peoples' choice of other satisfactions. The importance of recreation has not diminished.

Ware characterizes the role of the recreation resource manager as a client-serving consultant "who helps his client identify and solve recreation resource problems, or who himself acts in proxy to take the decision for his client." This is useful reminder of the manager's client oriented responsibility and the need to adopt an objective, professional service oriented responsibility. At least two omissions seem evident in this characterization, however.

First, as a professional consultant, the recreation manager serves a client "system" which must consider the return or reward objectives of the resource owner or agency, the user community (e.g. the public or a private group), and finally the user himself.

Second, the recreation manager may indeed be much closer to the action and in fact an owner or owner-operator having much more personally internalized objectives relating to management of the resource or a resource-based business. The problem with characterizing the resource manager broadly as a client-serving consultant sidesteps dealing with a host of major problems presently confronting research application. It conveniently excuses the writer from dealing with the large number of managers who do not, in fact, avail themselves of recreation research information. This is an issue confronting researchers, extension specialists and managers, namely, how do we get applicable research information in a useable form to an in-use status by managers. This issue is described finally (and perhaps tardily) in the context of the "Role of Extension Specialists."

The Discussion of the recreation or researcher's role probably provides the reader with the most accurate, comprehensive and useful insight to the researcher member of the researcher-extension specialist-manager "team." Ware clearly challenges researchers to measure their productive worth by how much their efforts increase the efficiency of the manager. He further describes the purposes of research, the ultimate clientele goal of researchers (the resource manager's client), and the difficulty of appropriately functional researcher-manager problem solving. This discourse handily sets the stage for the most important contribution of the paper, an analysis of communication conditions and "barriers" to research application.

From the viewpoint of an extension specialist critiquer I found Ware's approach a candid and lucid depiction of "as things now are" and how some of us at least might "like things to be." I commend this portion of his paper to all members of the recreation professionals team and especially to administrators for a careful and studied reading. Each of us should measure our respective individual and organizational contributions to the closure of the communication gaps as well as to the barriers we help create or augment.

This final section is a sound depiction of many of our fundamental problems. It is a stronger expression of those problems from the research scientists viewpoint than from the viewpoints of the manager or extension specialist, however. For example, little cognizance is offered of the diverse political, economic and social problems which confront the manager and extension specialist on almost a daily basis. It is probably a legitimate supposition that few researchers are aware of these manager and extension education arenas of effort on even a general basis.

Ware's final recommendation, that we search for and test new arrangements different than we now have for sharing responsibility in recreation resources management and research, offers little in the way of concrete step by step procedures. To be sure, he has briefly illustrated the idea of "management by objective" ad hoc problem-solving teams. This may indeed be possible between individuals in many situations and even between individuals of differing agencies, but it seems to require much further consideration to alleviate the barriers throughout the research application organizational system. In any case -- "new arrangements," perhaps as suggested by Crowe, as well as Ware may be the most worthwhile challenge before us.

TOPIC II

NEEDED RESEARCH

ABSTRACTS

DAVEY AND STOUT

Priority Needs in Outdoor Recreation Research.--High priority outdoor recreation tasks are recommended to researchers and research sponsors. These tasks, selected from sixty-five identified by participants at a BOR-sponsored symposium at Harpers Ferry, West Virginia in September 1974, include concern for substitutability among recreation activities, variables affecting participation, land use controls, key elements of recreation attractants, broad behavioral aspects, public reactions to fees and charges, and national energy policies. Several previous efforts are reviewed.

CORDELL

Priorities for Recreation Research in the Southern States.--Deviant behavior, off-road recreation vehicle use and use impacts on developed recreation sites are rated by southern states recreation managers as high priority problem topics for research. Also rated high are coordination and direction of recreation research and effective communication of research results. Although they generally agree with these as research priorities, there are some major differences between researchers' and managers' priorities which point to a communication problem and which need to be resolved.

CERMAK

Wilderness in the East: Problems for Research.--Contrasts between East and West in climate, topography, vegetation and density of settlement give some clues to research needs in wilderness on eastern National Forests. Smaller size of eastern wildernesses and their proximity to settlement may have important effects on volume of use and user satisfaction. The forest may be the most important factor in managing eastern wildernesses. Managers need to be involved in research and researchers should have a role in research applications.

MORE

Urban Forest Recreation: A Strategy for Research.--Recreation pressure on the urban forest is high and is expected to increase. Unfortunately, we know little about this forest or the people who use it. A research program to remedy this will be undertaken in the megalopolitan Northeast. Its goal is to develop a basis of scientific knowledge about recreation in the urban forest.

PRIORITY NEEDS IN OUTDOOR RECREATION RESEARCH

Stuart P. Davey and Neil J. Stout[1/]

Abstract.--High priority outdoor recreation research tasks are recommended to researchers and research sponsors. These tasks, selected from sixty-five identified by participants at a BOR-sponsored symposium at Harpers Ferry, West Virginia in September 1974, include concern for substitutability among recreation activities, variables affecting participation, land use controls, key elements of recreation attractants, broad behavioral aspects, public reactions to fees and charges, and national energy policies. Several previous efforts are reviewed.

INTRODUCTION

The continued growth of public recreation programs and activities places stress not only on the basic natural and attracting resources, but also on the land managers and public participants as well. Insufficient knowledge regarding the total interface of these actions and reactions can negate land investments, facility development, and public satisfaction. Facts are needed through research, and the challenge is to identify priority research needs.

Several previous efforts have summarized outdoor recreation research needs. The Bureau of Outdoor Recreation - University of Michigan effort in 1963[2/] is recognized as the initial national meeting of multi-disciplinary interests. Here, the groundwork was laid for future efforts along with the full recognition of the tremendous need to understand better the demand, supply, and social factors of the equation.

Regardless of this latter recognition of social import, early work by BOR on the first nationwide outdoor recreation plan found research endeavors had been concerned primarily with resources and slight attention given to the social and psychological aspects. As a result, the Secretary of the Interior asked the National Academy of Sciences to conduct a study and conference to develop a program of recreation research based on evaluation of needs. The conference was held in 1968 and the proceedings[3/] delineate the broad discussion and presentations of the resource, social, and economic considerations. This effort was especially valuable in its definitive analysis of recreation service systems. It is obvious, upon review, that the results of this study have never been fully utilized.

1/ Chief and Assistant Chief, Division of Federal Programs, Bureau of Outdoor Recreation, U.S. Department of the Interior, Washington, D.C.

2/ Proceedings of the National Conference on Outdoor Recreation Research, Co-sponsored by the School of Natural Resources, University of Michigan, and the Bureau of Outdoor Recreation, U.S. Department of the Interior, Ann Arbor, Michigan, May, 1963.

3/ A Program for Outdoor Recreation Research, a report on a study conference conducted June 2-8, 1968, by the NAS for U.S. Department of the Interior. National Academy of Sciences, Washington, D.C. 1969.

The trend at the moment is for regional discussion of research needs. We view this as a healthy situation, and the current efforts by the Forest Service and North Carolina State University are to be commended.

Our effort here is to recognize those priority tasks, as viewed in 1974 by a select group, and then to identify those underlying management problems we view as solvable through the suggested research.

METHODS

On September 4-6, 1974, forty-three scientists, administrators, and practitioners involved with the problems and issues of outdoor recreation met at the National Park Service's Mather Training Center in Harpers Ferry, West Virginia. The Interior Department's Bureau of Outdoor Recreation, in cooperation with the U.S. Forest Service and the National Park Service, called this meeting to assess the state of the art in outdoor recreation and to establish an agenda of current research needs. Based on this assigned mission, the participants identified four specific purposes for the Workshop:

1. To identify knowledge-gaps which hinder--or are likely to hinder in the future--the provision of adequated opportunities for the enjoyment of outdoor recreation by the American people;

2. To explore research opportunities--and suggest priorities--for addressing these knowledge-gaps;

3. To identify constraints upon recreation research and opportunities for increasing the effectiveness of recreation research efforts; and,

4. To foster adequate commitments of resources, talents, and energies to research applicable to outdoor recreation.

The first session of this three-day workshop heard representatives of agencies and institutions set forth their professional and organizational perspectives on recreation research. Their remarks are recorded in Chapter III of the Proceedings.[4/]

The core session of the workshop occupied the entire second day. Small workgroups undertook to examine knowledge-gaps and research problems in five broad areas of subject interest:

Social and Behavioral Studies
Resource Studies
Administrative and Political Studies
Activities/Facilities Studies
Economic Studies

4/ Bureau of Outdoor Recreation, Proceedings of the Outdoor Recreation Research Needs Workshop, Harpers Ferry, West Virginia, Sept. 4-6, 1974.

These workgroup recommendations are presented in Chapter IV of the Proceedings.

The final day's session was occupied with the presentation of the workgroup reports and a general discussion of research strategies. The strategy recommendations are summarized in Chapter V of the Proceedings.

Sixty-five research tasks were derived from the reports of the five workgroups. Time did not permit the assignment of priorities during the Workshop. Therefore, a priority ballot was devised later and distributed to all Workshop participants and certain other recreation professionals, including employees from all relevant organizational units of the Bureau of Outdoor Recreation.

Based on the survey response, 23 research tasks are recommended to researchers and research sponsors as meriting a top priority. They are listed in order of decreasing priority in Table 1. For each task, the table shows the relative priority levels assigned by Workshop participants, BOR respondents, and all respondents taken together. The five right hand columns indicate the areas of research interest (as represented by the five workgroups) which are of primary relevance to each task.

Complete details of the Symposium are available in the Proceedings cited above.

RESULTS

It is the purpose of this paper to present the ten research tasks highly ranked by the symposium participants and the functional, topical headings suggested therein.

Table 1 is self explanatory. Participants ranked number one the need to determine the degrees of substitutability among recreation activities in terms of "psychologically equivalent" experience. Equal ranking was given to the next four tasks to determine as follows:

1. Variables for predicting recreation participation;

2. Key elements of recreation activities which attract participants;

3. Substitutablity among recreation and locales, resources and facilities; and,

4. Effects of design on carrying capacity of certain resources.

Next ranked tasks included the following:

1. Determine standardized approaches to carrying capacity from the biological, physical and sociological aspects;

2. Evaluate various approaches to improving behavior of recreation area visitors;

Table 1. The 23 highest priority research tasks (of 65 recommended tasks) as judged by the 1974 Harpers Ferry Workshop participants and by other respondents to the priority survey--together with suggested research disciplines and approaches

RESEARCH TASKS[1] (In descending order of priority)	PRIORITY RANKINGS			SUGGESTED APPLICABLE RESEARCH DISCIPLINES AND APPROACHES (SEE FOOTNOTE[2])				
	PARTICIPANTS	BOR RESPONDENTS	ALL RESPONDENTS	A	B	C	D	E
Determine the degrees of substitutability among recreation activities in terms of "psychologically equivalent" experiences. (25)	***		**	X			X	
Identify characteristics of recreation participants--other than the traditional demographic variables--that can be effective in predicting their choices of activities and facilities. (This task is proposed in the recognition that the traditional demographic variables used in most existing recreation research give an incomplete picture of the relevant participant characteristics.) (21)	**	*	***	X			X	
Identify existing and potential means--including pending State and Federal land use control legislation--of establishing and protecting public recreation interests in private land. (32)		***	**		X	X	X	
Determine the key elements or aspects of recreation activities which attract participants. (20)	**	*	**	X	X		X	
Determine the levels of substitutability among recreation locales, resources, and facilities--also in terms of "psychologically equivalent" experiences. (26)	**		*	X	X		X	
Identify the effects of design on the carrying capacity of certain recreation resources particularly in high density use areas. (52)	**		*		X		X	
Establish standardized approaches for determining biological, physical, and sociological carrying capacities of recreation resources for specific activities and specific types of environments. (50)	*	**	**	X	X		X	
Develop guidelines for enhancing recreation opportunities in the course of non-recreation land development and management activities. (such as in Task 56 below) (57)		**			X	X	X	X
Evaluate alternative approaches to minimizing conflict and securing cooperation among public agencies and also between the public and private sectors in the provision of recreation areas and services. (44)		**		X			X	
Evaluate the effects on public recreation programs of existing and potential legislative enactments related to sources of funding. (36)		**				X		X
Evaluate various approaches to improving behavior of recreation area visitors such as restrictions, penalties education, interpretation, and modifications in planning and facility design. (49)	*		*	X		X	X	
Identify and evaluate the relationship of recreational and leisure pursuits with other life domains--such as job and family--in terms of systems, processes, outputs, benefits, and meanings. (60)	*	*	*	X			X	
Develop techniques for predicting changes in recreation consumption patterns associated with major shifts in variables affecting how Americans live. (3)	*	*	*	X				X
Ascertain those components of recreation activities and/or facilities that seem to be valuable in terms of enhancing participants' self-realization, self-actualization, and self-image. (30)	*		*	X			X	
Develop and evaluate means of minimizing the adverse effects on recreation opportunities of non-recreational activities such as timber-cutting, drainage, irrigation, energy development, channelization, dredging and filling, urbanization, industrial operations, mining, and highway building. (56)	*	*	*		X	X	X	X
Identify and evaluate the factors involved in non-participation and anti-recreation behavior. (29)	*	*	*	X			X	
Determine the dynamic properties of recreation activities, facilities, and service systems that can influence changes in recreational tastes over time (cultural, psychological, sociological, etc.) (22)	*		*	X			X	
Determine the relative resiliencies of certain ecological systems if recreational carrying capacities are exceeded; and develop techniques for improving such resiliencies. (51)	*				X		X	
Analyze the effects of environmental education and interpretation on the quality of recreation experiences. (64)	*			X	X		X	
Evaluate the effects on outdoor recreation opportunities of political considerations such as energy policy, environmental protection, and highway construction. (47)		*	*		X	X		
Identify the relationship between public fee structures and the supply of competing and complementary private facilities and services. (12)		*				X		X
Analyze the effectiveness, benefits and costs of the use of recreation services to reduce deviant behavior and ameliorate social problems. (14)		*		X			X	
Identify and evaluate those public and private property aspects of land and resources which are relevant to outdoor recreation. (31)		*			X	X	X	

*** Highest priority task--out of 65 recommended research tasks--as identified, respectively, by Harpers Ferry Workshop participants, BOR respondents to the priority survey, and all survey respondents taken together, (Ranking criteria are described in Appendix A.)

** Next 4 tasks in descending order of priority as identified by each of the above groups of respondents.

* Next 10 tasks in descending order as above.

[1] The number in parentheses following each research task description is the sequence number of that task as listed in the priority ballot. See Appendix A.

[2] Suggested applicable research disciplines and approaches as represented by the five workgroups:

A. Social and behavioral studies
B. Resource studies
C. Political and administrative studies
D. Activities/facilities studies
E. Economic studies

3. Evaluate relationships of leisure pursuits to other life domains;

4. Find techniques to predict changes in recreation patterns associated with major shifts in variables affecting life style; and,

5. Ascertain components of recreation activities valuable to participant self development.

The rest of the 23 relate to lower ranked tasks, but still are of importance in the areas of non-participation/anti-recreation behavioral aspects of recreation and all of its implications for management maintained a high profile, and need for research. Governmental agencies, as you probably are aware, are wary of behavioral research, especially when applied to the users of their facilities.

We view the results of the symposium and the analysis of the priority tasks identified by participants and subsequent reviewers in the following terms and needs for research, in behalf of managers of public, and probably private, recreation enterprise:

First, the "why" and the "substitutability" of participant action, resource attraction and general behavioral aspects are of great importance to understand better the recreation phenomenon. Much remains to be accomplished here.

Second, while the "resource capacities" are increasingly clear, the sociological/psychological capacities are not. Here again, much remains to be accomplished. We are pleased to report that BOR is funding during this fiscal year some research on carrying capacities, including the human aspects thereof.

Third, our ability to predict demand within an understanding of the rapidly changing lifestyles around us are sorely lacking. Of great importance is the rapidly changing energy scene. The "who" is going to do "what" question remains a challenge. In FY 1975, BOR funded a National Academy of Sciences study of the whole demand question. That report is expected soon.

Fourth, the whole thrust of recreation development needs early analysis, if for no other reason than to answer the increasingly common complaint that "operation and maintenance funds are unavailable," therefore, no area, no facilities. The thrust of Federal properties and programs upon lower levels of government might or might not accelerate such reactions--or a surplus of facilities may, in fact, exist in many areas. On the other hand, the American expectation of "free" public recreation could dictate the financial inabilities of agencies to provide opportunities beyond a given level. Facts here are needed as soon as possible. Again, we are pleased to report that the BOR is funding this fiscal year an analysis of public reaction to public agency recovery of operation and maintenance costs for recreation facilities.

DISCUSSION

The sponsors recognize that the Harpers Ferry Workshop was held under certain significant limitations. Essentially one working day was available

to the conferees. The participants' backgrounds did not cover the full spectrum of recreation practitioners and scholars. A good start was made on identifying research needs, but it will be essential to establish linkages to other professional interests in the future.

The Harpers Ferry Workshop stressed the "people" aspects of outdoor recreation. Behavioral science approaches to recreation problems received more emphasis than the traditional economic approaches. Special emphasis was given to the meaning of recreation experiences to the participant--the benefits he seeks and the results he actually achieves. Those present felt that the complex of man-environment interactions called outdoor recreation must be understood much more deeply and comprehensively if Americans are to have a full range of opportunities to enjoy the outdoors.

The Workshop participants and the survey respondents were not representative of all areas of interest in outdoor recreation. Urban and commercial recreation interests--as well as the health and design professions--were underrepresented. It should be noted, however, that the proposed research tasks focus on underlying principles and relationships. Results of this research would apply to a broad spectrum of outdoor recreation situations, locations, and activities. The participants deliberately avoided dealing with specific recreation activities such as swimming, bicycling, or off-road vehicle use.

CONCLUSION

Our conclusion is that the Harpers Ferry Workshop was a useful method to update outdoor recreation research needs. Further, the proceedings of the meeting can serve as the vehicle to a greatly expanded audience whose concern and interest can assure needed solution to many problems. The priority items listed in Table 1 can be used or amended for numerous specific research tasks. The several research projects contracted recently by our own organization stand as examples.

More important, we believe, are the functional areas identified for research to assist both the research and recreation manager both to understand and manage better the recreationist and the opportunities he seeks.

PRIORITIES FOR RECREATION RESEARCH IN THE SOUTHERN STATES

Harold K. Cordell[1/]

Abstract.--Deviant behavior, off-road recreation vehicle use and use impacts on developed recreation sites are rated by southern states recreation managers as high priority problem topics for research. Also rated high are coordination and direction of recreation research and effective communication of research results. Although they generally agree with these as research priorities, there are some major differences between researchers' and managers' priorities which point to a communication problem and which need to be resolved.

Additional keywords: Research priority, recreation research, recreation problem identification, research communications.

One of the most frequently voiced complaints about research is that it is not addressing the problems of highest priority. Managers and planners often feel that their informational needs are being ignored. The 1974 National Outdoor Recreation Research Needs Workshop was one effort to overcome this shortcoming of research. Another effort which addressed the Southern States specifically was conducted by the Southern Regional Task Force on Research Needs in Recreation, Aesthetics and Other Landscape Values.

The basic philosophy under which the Task Force operated was one of making sure that the most important issues or problem areas had first been identified and rated before any attempt was made to list studies needed to address these problems. Focusing first on "needed" studies instead of identifying high priority problems seems to be a common error of many previous efforts to identify research needs. The basic pitfall of this approach is that the problem, the underlying reason, for doing research in the first place very often never becomes evident. As a result we are never sure that the highest priority problems are being addressed and the complaint that research needs to be more relevant is reinforced.

The Task Force was composed of a multidisciplinary team including an economist, a sociologist, an extension and planning specialist, a forester, an ecologist, and a psychologist. The procedure was to identify the more important problem areas in recreation management and planning and to obtain a priority ranking of these problems by asking researchers and practitioners in the 13 Southern States to vote on the importance of each.

Twenty-one different problem areas were identified by the Task Force after considerable input from a selected panel of managers and planners. The final list of problems along with a written description of each problem situation

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was sent to recreation practitioners and researchers throughout the Southern States. Persons receiving this material were asked to rate each problem independently by assigning a scale value from 1 (most important) to 5 (least important). A total of 186 practitioners and 40 scientists responded representing a wide range of private, federal, state and local concerns. A similar assessment of these 21 problem areas was obtained from participants in this Workshop.

PRIORITY PROBLEMS FOR RESEARCH

In table 1 titles of the 10 highest priority problems are listed. These are ordered according to the 1974 voting by practitioners only. The criterion for ordering was the percentage of respondents which ranked a problem as number 1 or number 2 in importance on a scale ranging from 1 to 5. Also shown is the voting on these same problems by the practitioners attending this 1975 Workshop. All who indicated they would be attending were sent a ballot and problem descriptions identical to those mailed to Southern States practitioners in 1974.

There were some substantial differences in the ranking of the 21 problems between this Workshop group and the respondents to the 1974 survey. Some of this is the result of the Workshop group's being less representative of the total range of southern recreation management interests. Some of this difference may also be due to increased awareness of problem situations.

The top 3 problems identified by Workshop attendees were:

1. Physical and biological impacts of recreation use on developed sites (74 percent voted 1 or 2)
2. Littering, theft, vandalism and other deviant behavior in recreation areas (73 percent)
3. Coordination and direction of southern recreation research (65 percent).

These 3 problems were among the top 5 as ranked by the 1974 survey respondents and indicates a degree of general agreement between the two groups. This also reinforces the 1974 finding that research dealing with developed recreation sites and management problems associated with the recreational use of these sites is still very much in demand. Researchers and funding sources have been strongly deemphasizing this direction for research in recent years.

Use of wild lands or other areas by off-road recreation vehicles was also rated relatively high by the Workshop attendees (no. 6 overall, 56 percent ranked it 1 or 2) and it was rated especially high by the 1974 group (no. 2, 82 percent). The obvious resource impacts, conflicts with other recreationists, and large numbers of participants are likely reasons for this outcome.

A major difference between the Workshop group and the 1974 survey respondents was the ranking of two problem areas as highly important for research attention:

1. Communication of recreation research results (65 percent of Workshop group, ranked no. 4)

Table 1.--Ten highest-priority problems ranked by southern states practitioners and percentages rating each problem 1 or 2

Problem Title	Percentage of practitioners who rated problem 1 or 2		Rank order by 1975 respondents[a/]
	1974	1975	
Littering, theft, vandalism and other deviant behavior in recreation areas	85	73	2
Use of wild lands or other areas by off-road recreation vehicles	82	56	6
Physical and biological impacts of recreation use on developed sites	82	74	1
Evaluation of recreational benefits from urban forest and open space resources	64	39	15
Coordination and direction of southern recreation research	63	65	3
Interpretation and understanding of forest and natural environments	62	47	10
Methodology of recreation research	59	48	9
Benefit/cost analysis of recreation alternatives	56	43	14
Providing recreation opportunities for the aged and handicapped	54	21	21
Inadequate data bases and methods for comprehensive recreation planning	50	47	12

[a/] Indicates relative ranking from the original list of 21 problems.

2. Evaluation of environmental impacts resulting from recreation use and development (61 percent, ranked no.5).

These two problem areas received much lower ranking in 1974 (ranked no. 10 and no. 13 by the 1974 group).

Particularly notable in the voting of the Workshop group is the ranked importance of having well coordinated research directed toward the most relevant problems (ranked no. 3) and, as indicated above, of adequately and clearly communicating the results of research so that it can be understood (ranked no. 4). These problem areas, of course, are primarily the reason for attending this Workshop.

DIFFERENCES BETWEEN MANAGERS AND RESEARCHERS

It is evident from the 1974 survey and from the survey of Workshop attendees that coordination and communication between researchers and practitioners strongly need to be improved. Dick Cottrell, Dennis Crowe, and Ken Ware addressed some of the problems associated with getting a more smoothly operating working relationship and better communication between researchers, extension specialists and practitioners. They also discussed some of the possible actions that could be taken to achieve improvements.

The need for better communication was vividly pointed up by comparing the ranking of problems by practitioners and scientists attending this workshop. While practitioners are more concerned with the impact of the recreationist on the site and with other day-to-day management problems, we scientists appear more concerned with broader social issues and with theoretically related questions. The six top ranked problems by scientists included:

1. Use of recreation and aesthetic preferences in the development of resource management and utilization policies (77 percent)
2. Use of phychological needs data for recreation resource decisions (77 percent)
3. Evaluation of recreational benefits from urban forest and open space resources (77 percent)
4. Effects of public and private recreational developments on social change and life-styles of local communities (66 percent)
5. Control of littering, theft, vandalism and other deviant behavior (66 percent)
6. Coordination and direction of recreation research (55 percent).

The voting by both practitioners and scientists indicates the importance of deviant behavior and research coordination problems. But disagreement concerning other top priority problems indicates a real need for more communication between those of us attending this Workshop. The 4 problems ranked highest by managers and planners were ranked 9, 5, 6, and 11 by the researchers who are here.

SUMMARY AND DISCUSSION

It appears that we are able to identify important problems to which research should be applied. But there is some disagreement concerning which problems are most important. Managers, planners and administrators are more concerned with problems with which they must deal every day. Researchers appear to be concerned with more basic questions and with theory building. Yet the clientele of the researcher is the manager. Does this indicate that the direction which research takes should be dictated by the manager? But if this happens, what will become of basic research which has its value in addressing questions that have more general or long-range consequences?

WILDERNESS IN THE EAST: PROBLEMS FOR RESEARCH

Robert W. Cermak[1/]

Abstract.--Contrasts between East and West in climate, topography, vegetation and density of settlement give some clues to research needs in wilderness on eastern National Forests. Smaller size of eastern wildernesses and their proximity to settlement may have important effects on volume of use and user satisfaction. The forest may be the most important factor in managing eastern wildernesses. Managers need to be involved in research and researchers should have a role in research applications.

Additional keywords: Contrast in size and scale, alternatives, carrying capacity, vegetative influences on resiliency, individualized definition of wilderness.

For a resource manager born in the West and raised on western resource problems, the East is a startling contrast. The most striking aspects of eastern North America, as we drove from Pueblo, Colorado to the Shenandoah Valley of Virginia in August 1972, were the abundance of green vegetation and the presence of homes, communities and small towns throughout the land.

The land was softer, more receptive than the sagebrush flats of Wyoming and South Dakota; the barren peaks of the Rockies; the alkali plains of the Great Basin; or the sunbaked foothills of the Sierra Nevada.

We saw mountains; they were sometimes imposing, but they had rounded summit and were entirely covered with trees. In fact, trees were everywhere - between houses and towns, in plantations, alongside cornfields and far off into the distance. For someone who had traveled many miles in the West and seen only scraggly windbreaks or a few cottonwoods, it was refreshing.

There were houses, farms and small communities within sight almost constantly. We couldn't help but contrast the scene with the long, lonely trip through Wyoming's Thunder Basin; our drives across Nevada, nearly empty of people and places; or the sparsely settled high deserts and mountains of eastern Oregon.

If you are worried that this is a travelogue and not a paper on eastern wilderness problems, let me reassure you at this point. I began this way because there are great contrasts in East and West and these few paragraphs have illustrated some of them. These are some of the contrasts we need to consider when discussing research needs in wilderness on eastern National Forests.

These contrasts are important because designated wilderness is new to eastern National Forests. If we exclude the Boundary Waters Canoe Area as a special and unique situation, there were only three small designated National Forest Wildernesses in the East before the Eastern Wilderness Act was signed on January 1975. This new management situation appears to call for new research. Application of knowledge learned in western wilderness without modification to the East could lead to more problems than it solves.

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The West is an expansive, wide open country, full of long vistas. Scale is magnified and scenery can be almost overpowering. On the other hand, the East has lower relief, is dominated and softened by forest and other growth. Climatic conditions and the dense forest often restrict views to the close-in, the smaller scale of trees, streams, wildlife and flowers.

The contrast in scale is matched by a contrast in size between eastern and western wilderness. Averages can be deceiving but they illustrate this point well enough. As of December 31, 1974, the average size of 66 western National Forest wildernesses was 160,943 acres while the average of 18 eastern National Forest wildernesses is 12,602 acres (excluding Boundary Waters Canoe Area). Only four eastern wildernesses are over 20,000 acres in size.

What effect does size have on use and management of eastern wilderness? Will carrying capacity be subject to the same limitations as in western wilderness? In view of the small size, how should surrounding lands be managed?

The answers to these questions may depend upon the reasons why people visit eastern wilderness.

Typically, western wilderness supports most of its use in narrow bands along lakes and streams with trail access. However, even this use is not equally distributed. Stankey (1973) reported on three western wildernesses where use was concentrated at a few of the most attractive fishing areas, lakes and streams and near access points.

Eastern wilderness often lacks outstanding fishing, lakes and large streams; cross-country travel is limited by the heavy forest growth. What will bring visitors other than a desire for solitude? It might be the desire to hike the wilderness trails. Hiking has a long tradition in the East and backpacking is growing rapidly in popularity.

If hiking and backpacking in a forested atmosphere are major reasons for using eastern wilderness, then a new look at trail routes and the density of trails would be needed. The thick forest in most eastern wildernesses would permit more trails per acre and more use, provided overnight camping space were available.

Under these circumstances, size may be less important as a factor in meeting eastern wilderness needs. Perhaps state and local government could also play a larger role in supplying designated wildernesses. Industry's "pocket" wilderness could become another alternative. How small can a designated wilderness be in the East and still provide a wilderness experience?

One of the contrasts I mentioned earlier had to do with the density of settlement in the East versus the West. It is not uncommon to find houses, farms, towns and highways adjacent to eastern wildernesses or to have cities within a few miles. It is difficult to say what effect the proximity of settlement will have on user satisfaction. It may not be as important as it first appears because thick cover masks sight and sound, even when it is only a mile distant or less.

The forest seems to me to be the key element in eastern wilderness. Perhaps this is appropriate for the term "wilderness" originally referred to the forest and its wildlife (Nash 1967). The eastern forest is not tame as anyone can attest who has struggled through a laurel thicket on a cloudy day. In fact, parts of some designated eastern wildernesses and some study areas are downright dangerous to be in because of wildlife or terrain features. Eastern forests aggressively take over old fields or openings with a growth so thick that it can become oppressive. The demand for eastern wilderness arose partly because of the eastern forests' ability to heal its wounds quickly; what once had been cutover woods became wilderness forty years later.

Forests are so wide spread over the East that they may affect the attitude of people in the East toward wilderness. Many easterners think the wilderness is at their back door. They can visit the woodlot or go over the fence to the paper company or lumber company's land. Or the National, State or township forest is near at hand. In a few steps they are swallowed up by the forest.

"When we walk, we naturally go to the fields and woods.....," Henry Thoreau said in his famous essay, Walking, "My vicinity affords many good walks; and although for so many years I have walked almost everyday, and sometimes for several days together, I have not yet exhausted them." (Duncan 1972) To be sure, he also complains about the building of houses and cutting down of the forest but when visiting Concord, Massachusetts two years ago, I was interested to find most of the country nearby is still wooded.

Several writers have said that wilderness is found along a spectrum from the most civilized place to the least. Carhart (1961), Spurr (1966), and Nash (1967), for example have all suggested that the definition of wilderness is so highly personal that it means something different to each of us. A logical expression of this idea is, as they propose, a scale or spectrum of situations varying from the least wild to the most wild.

If the forest is a major element in what most of us think of as wilderness, then the easterner has a distinct advantage over his western counterpart. In the East, the forest is almost everywhere except in the urban areas and the cultivated farmlands. It offers easy escape from the sights and sounds of civilization. But the East also has many more people than the West.

Managers of eastern wilderness need to know how to keep these small areas from being overrun by visitors from the massive population centers of the East. Are there different attitudes toward wilderness in the East? What are the alternatives to legislated wilderness in the East?

Lloyd and Fischer (1972) describe a continuum of recreational opportunities and point out the need for "more, and a wider variety of, dispersed recreation opportunities outside designated wilderness." I agree, but believe this approach is only half of the solution. We need to actually deemphasize visitation to designated wilderness while we emphasize the opportunities elsewhere. Many wilderness visitors seem to think they will have a blinding flash of "wilderness experience" when in the confines of a designated wilderness. I think the wilderness spectrum of Nash, Spurr and others largely coincides

with the recreation opportunity continuum described by Lloyd and Fischer. Most people can find their personal wilderness experience outside designated wilderness and often it can be a higher quality experience. Certainly we need to encourage them to do so if we are to avoid overuse of eastern wilderness within a few years after their designation.

Protection of wilderness from human overuse is the greatest concern in many western wilderness. Insect and disease attacks usually are allowed to run their course; and in predetermined portions of some wilderness, wildfires are allowed to "burn themselves out."

We need research to determine the potential effects of insect, disease and fire on the small wilderness of the East. Can we afford to allow wildfire, oak wilt, southern pine beetle, gypsy moth and similar threats to the forest to "burn themselves out?" With large areas of forest gone from the eastern wilderness, would the wilderness experience remain?

A brief review of the contrasts between East and West has brought out some problems for research to consider. Summarized they are as follows:

1. What effects will small size have on use and management of eastern wilderness? Can size be even smaller? If so, do state and local government and industry have a role in supplying wilderness?

2. What should be the carrying capacity of eastern wilderness?

3. What effects do the small size of eastern wilderness have on the management of surrounding lands?

4. What is the public concept of eastern wilderness?

5. What are the reasons besides a search for solitude that people visit eastern wilderness?

6. How does dense forest growth help or hinder management of eastern wilderness?

7. How can we emphasize the use of non-wilderness and deemphasize the use of designated wilderness?

8. What are the potential effects of serious outbreaks of fire, insects or disease on the wilderness experience in eastern wilderness?

I am sure there must be many more problems associated with management of eastern wilderness but it is appropriate at this point to say a few words about solving problems.

In a new venture such as managing eastern wilderness, we need the benefit of all that has been learned elsewhere about wilderness management. We need new knowledge because, as outlined above, the eastern situation is different.

Making the most of research capabilities requires cooperation between manager and researcher.

I would not be the first to say that cooperation between researchers and managers has not been effective. It is too often true. This is sad because both are losers. New knowledge could save the manager time and money and produce a better service or product. And for the researcher, the real payoff is not the paper he produces but the effect of that paper on management methods and attitudes.

It is pretty well agreed in management theory that the involved worker will be more interested in the quality and quantity of the product. The manager should have a stake in the research if he is to be committed to it and the researcher should be involved in the application of research results if progress is to be made.

Douglas MacGregor (1967) says, "Identification and commitment rest on linking the individual's own goals with those of the organization." If the manager and researcher can agree on the goals they seek and keep in contact during the management and research process, then they are both more likely to be successful. In my opinion, the manager must assume the larger burden and go more than halfway in providing the climate that makes for effective research, and also effective application of research results and the feedback the researcher needs.

In closing, I would like to say a few words about the realities of wilderness management on National Forests of the East. Wilderness management does not exist in a vacuum. It must be accomplished by men who have many other demands on their time and who face an increasing workload with a stable or declining budget. Typically they will react to the heaviest pressures first and wilderness use usually generates comparatively light pressure.

Managers must have priorities and wilderness management must fit into that priority system. What really counts are the results on-the-ground. Too often research and even policy have been frustrated by the use of ineffective methods for transforming them into action. It behooves us all to look at what is really happening on-the-ground if we are to be successful in improving management and research.

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A CRITIQUE OF THE PAPER ENTITLED "WILDERNESS IN THE EAST: PROBLEMS FOR RESEARCH"

R. Duane Lloyd[1/]

Robert W. Cermak has posed eight questions about eastern wilderness management that he recommends for research. In general I agree, but I want to build on his case further and offer some additional perspectives.

The eight questions have been developed from a background of contrasts between western and eastern wilderness resource conditions such as forest types, density of vegetation, typical scale scenery, screening of sights and sounds by vegetation, proximity to population centers, and typical size of wilderness areas. Recognizing differences between the East and West is important, but there also are some similarities that need to be recognized, too.

Much of our best wilderness research has been quite fundamental. For example, the basic patterns of interactions by visitors with the wilderness environment and with one another (Frissell and Stankey 1973) are the same in the Boundary Waters Canoe Area (BWCA) and in the West. Also, independent research in the two ends of the country indicates that hikers, their preferences, and their behaviors are essentially the same in both West and East (Hendee et al. 1968, Murray 1974).

Where research has developed basic principles, they should be applicable in both the East and the West. It should not be necessary to do eastern wilderness research that will "reinvent" things already learned in the BWCA and the West. This is particularly true for research on people who visit wilderness and seek dispersed types of recreational opportunities.

At the same time, Cermak is correct in telling us that the resource differences are important and that we will need to modify western management practices for use in the East. Pilot testing, further development, and modification will be needed. This can come best through teamwork by research scientists and resource managers.

In the West, Forest Service research has given more attention to wilderness visitors than to the resources. I see a need, in the East, to give considerable priority to studies of the resources and visitors' impacts on them.

It may be that the denser vegetation in eastern wildernesses will permit higher visitor-carrying capacities than in the West. At any rate we expect heavier rates of visitation because of the proximity of large numbers of people. Impacts of visitors on the land, water, and vegetation are a high-priority wilderness and backcountry management problem. The North Central Forest Experiment Station, in cooperation with the Superior National Forest and the University of Minnesota, has done some research of this kind in the BWCA. The Northeastern Forest Experiment Station has started work of this kind in New England, in cooperation with the National Forests, the Appalachian Mountain Club, and several universities.

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Ecological succession proceeds more rapidly in the East than in most of the West. Thus it is important that we face the problems of biological management of wilderness. To many people the phrase "management of wilderness" is unacceptable; they seem to assume that man can pickle and preserve dynamic ecological systems. Research has shown that total protection can cause unnatural biological results (Heinselman 1973). The potentially undesirable results of management for protection only will become evident much sooner in the East than in the West.

I join Cermak in a plea that wilderness research be conducted with a broad perspective that will require examination of wilderness-management problems within a larger context. The key to wilderness management may lie in nearby non-wilderness. We also need to remember, and help the public understand, that wilderness has not been established for recreational purposes alone. The Wilderness Act has dual objectives, which I paraphrase as (1) nature preservation and (2) primitive recreation. We need to do the research and development that will help bring to pass a balanced spectrum (or continuum) of forest-based recreational opportunities so that we can, as Cermak urges, "...deemphasize visitation to designated wilderness while we emphasize the opportunities elsewhere."

Wilderness research began in the BWCA and has made substantial progress in the Northern Rocky Mountains, the Pacific Northwest, and most recently in California. Significant research contributions have been made in less than 10 years, with a modest budget and a small team of scientists. A number of research findings have been integrated into wilderness-management policy and plans. Examples include the uniform wilderness permit, segregating or zoning uses--based on different preferences and styles of travel, size-of-party limitations in the BWCA and some other places--and the coming use of the new wilderness travel simulator. The simulator is a good example of Research-National Forest System (NFS) teamwork. The idea began with research scientists; the final product (now being handed over to NFS wilderness managers) was polished through a joint NFS-Research pilot-test and development effort.

We have able and aggressive resource managers who are dedicated to the wilderness concept. We have a national team of capable and creative research scientists. Experience over the past 10 years shows that we can do outstanding research and work as a team to apply it. I am confident that we can and will (1) adapt basic principles to eastern conditions, (2) solve wilderness problems unique to the East, and (3) apply the results.

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URBAN FOREST RECREATION: A STRATEGY FOR RESEARCH

Thomas A. More[1/]

Abstract.--Recreation pressure on the urban forest is high and is expected to increase. Unfortunately, we know little about this forest or the people who use it. A research program to remedy this will be undertaken in the megalopolitan Northeast. Its goal is to develop a basis of scientific knowledge about recreation in the urban forest.

Additional keywords: Urban parks, recreation behavior.

Every day, millions of Americans use city parks and forests for recreation. Despite the obvious importance of these areas, most of our recreation research has been focused on wilderness and other remote areas. Few studies have dealt directly with recreation in the urban forest. In this paper, my purpose is to describe and explain a program of research on urban forest recreation that I am developing with other scientists in the USDA Forest Service's Pinchot Institute for Environmental Forestry Research.

THE PROBLEM

By the year 2000, if current trends continue, the vast majority of our population will be concentrated in large metropolitan areas. Access to the forest for recreation will be limited. Some people will, of course, have the money to visit any forest anywhere, but for most people the neighborhood will continue to be the dominant living space. Their principal contact with forests will probably be in public parks and on occasional trips to the fringes of the metropolitan areas. This forest, with buildings, fields, houses, roads, fences, and private holdings interspersed, is the urban forest.

The pressure on the urban forest for recreation is high, and a number of trends indicate that it will continue to increase. First, most Americans have more leisure than ever before, because of decreases in the workweek (Zeisel 1958) and in the length of working life (Wolfbein 1954). In addition, experts have predicted that a 4-day, 34-hour workweek will be the average by 1985 (Shafer, Moeller, and Getty 1974).

Yet, it is not the total quantity of leisure that is important to recreation, but rather its distribution. Much of the total amount of leisure is found in time off after work or school, or on weekends--times when there is little chance to make major trips into our more remote forests. The result is that people who want to visit the forest during these times visit the urban forest--the one close to home.

Other factors augment the importance of the urban forest in satisfying the recreational needs of Americans. First, the country is currently

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experiencing a severe recession. Many people are unemployed and many others are concerned about keeping their jobs. People today are worried about money. As a result, major trips and vacations are being put off in favor of shorter trips closer to home. This implies a greater demand for recreation in the urban forest.

Second, the current shortage of energy supplies, with rapidly rising gasoline prices, gasless Sundays, and especially the uncertainty about adequate gasoline supplies, has probably caused many people to stay closer to home, visiting the urban forest rather than its more remote counterpart.

Despite the fact that so much recreation occurs in the urban forest, this is precisely the forest that we know the least about. Much of our research has been aimed at understanding the wilderness user or the visitor to developed campgrounds in remote forests. It should come as no surprise that almost all our studies find us dealing with highly educated, white, upper middle class people. By focusing so much of our attention on these people and these areas we are overlooking millions of other people who use the forest--the urban forest. We are also neglecting millions of potential consumers of our services who might visit the forest if they had the opportunity to do so.

Here, then is the crux of the problem: there are millions of consumers and potential consumers of urban forest recreation in our nation's cities about whom we know little or nothing. We need a research program to develop a base of scientific information both about these people and about the recreation resources of the urban forest so that we can facilitate the delivery of forest recreation services to the largest segment of our population--the people of our nation's cities.

THE GEOGRAPHICAL AREA OF CONCERN

What is meant by the urban forest? A USDI (1974) definition of an urban recreation complex may help. They began by including counties that were within 120 miles of a central city with 500,000 or more population. This area is then divided into two zones--a day-use zone from 0 to 40 miles, and an overnight-use zone from 41 to 120 miles. The inner zone is assumed to be within 1 hour's travel of the city, while the outer zone requires more extended trips of 2 to 3 hours.

There are 58 of these urban recreation complexes throughout the United States. While I hope that our research findings will be applicable to recreation management around all the nation's cities, the primary focus of our research will be in the megalopolitan areas of the Northeast.

Megalopolis consists of a series of metropolitan centers from Boston, Massachusetts, to Washington, D.C., surrounded by rural areas that supply resource services such as water, food, and recreation. This service area (5 percent of the nation's land) extends from Canada to North Carolina, between the Appalachians and the Atlantic, and contains 26 percent of the nation's population (Gottman 1961).

Pronounced changes from rural to urban land uses are occurring within this area, and a shift of 8,755,000 acres to urban use is expected between 1960 and 2020. The area's population has increased from 34.4 million in 1940 to 50 million in 1970. It is expected to reach 55.6 million by 1980, 69.5 million

by 2000, and 86.2 million by 2020 (USDA 1970).

Marked changes in the distribution of land uses are expected in the North Atlantic Region between 1963 and 2020: decreases in cropland (from 15.2 to 6.0 percent) and pasture (6.3 to 2.6 percent), and increases in forest land (57.4 to 64.4 percent) and urbanized areas (6.0 to 14.3 percent) (USDA 1970).

TOPICS FOR RESEARCH

Considering the nature of the problem, we felt that a logical approach was to ask these questions: What areas and activities are available to urban people for recreation? What do people actually do in these areas? What do urban forest recreation areas mean to their users? What benefits are provided by urban forest recreation areas? And how do people choose one area or activity from an array of alternatives? Each of these questions translates loosely into a general topic for research, and each is discussed more fully below.

I. Supply characteristics of recreation in the urban forest (i.e., what areas and activities are available)

This research topic has received fairly extensive treatment in the literature. For example, the USDI (1974) found that the Northeast (including New England, New York, New Jersey, and Pennsylvania) is over 90 percent rural (non-city) and contains 100 million acres of open fields, marshlands, and woodlots. Yet the Northeast ranks last in recreation acreage per capita, with 0.2 acre. State-owned areas make up most of this acreage (table 1).

Table 1.--Recreation areas in the Northeast in public ownership

Type of government	Area
	(millions of acres)
Federal	1.9
State	7.9
County	0.1
Municipal	0.2
Total	10.1

Recreation land is even more scarce for residents of metropolitan areas: only 0.04 acres per capita in the Northeast (USDI 1974). The supply of specific types of facilities is shown in table 2.

This and similar surveys of metropolitan areas (e.g. National Recreation and Park Association 1974) have given us adequate knowledge of the recreational opportunities in and around our nation's major cities, both in the Northeast and in other regions of the country. But there is a related topic which has not received much research attention and upon which we will focus our research effort: the public's perception of the facilities available to it.

Table 2.--Recreation facilities in the Northeast (from USDI 1974: 109)

Facility	Within 40 miles of central city				Within 41-120 miles of central city			
	Public		Private		Public		Private	
	Acres	Units[a/]	Acres	Units	Acres	Units	Acres	Units
Swimming facilities								
Pools	15	73	364	239	19	70	532	262
Beaches	5,110	832	4,565	768	1,002	546	4,205	1,554
Trails								
Foot	971	1,275	3,562	4,675	2,949	3,927	6,075	7,973
Bicycle	275	336	152	200	--	--	504	661
Horseback riding	288	298	1,879	1,942	304	314	2,494	2,577
Campgrounds								
Tent camp	2,094	12,478	12,087	42,504	6,004	24,577	12,122	43,696
Trailer camp	200	723	3,593	32,916	215	2,549	5,726	49,102
Group camps (capacity)	1,122	74,138	12,227	31,066	1,076	112,973	13,838	38,165
Picnic sites	15,627	89,393	30,858	78,427	6,928	106,806	31,585	78,950
Playfields	41,270	511	14,636	3,571	2,867	605	12,008	2,578
Winter sport sites								
Ski sites	965	80	8,206	320	2,756	174	2,092	126
Ice skating sites	3,220	585	4,768	715	4,304	396	12,391	704
Golf courses	12,002	25	90,083	1,112	2,065	23	72,721	1,065

[a/] In numbers of units, except that trails are measured in miles, campgrounds are measured in spaces for tents and trailers, group camp capacity is measured in number of persons accommodated, and picnic sites are measured in number of tables.

It is axiomatic that people cannot use an area unless it appears within their life space. In other words, people must be aware that an area exists before it will affect their behavior. Moreover, even if people are aware that an area exists they may not use it for a variety of reasons, such as socio-cultural barriers to participation; concern about safety; lack of time, money or skill; or belief in any of a variety of misconceptions about the area or the services provided there.

Thus, the research we will undertake deals not with the total supply of recreational opportunities, but rather with the effective supply. Projects like this seem especially desirable because they permit us to educate the public about nearby recreation opportunities while we are gathering information.

II. Use of urban forest recreation areas

The tremendous growth in demand since World War II has shown beyond all doubt that forested recreation areas are highly attractive to the general public. We know, too, that separate demands exist for a wide range of activities like camping, hiking, hunting, fishing, etc.; and that each of these activities appeals to a different type of people. What we do not know is how people actually use an area. What do they do when they arrive at the site? Where do they go and why? What kinds of activities and behaviors do they engage in on the site? How long do they stay? When do they leave? If an area offers several activities, which one do most people select, and why? When an area offers several sites for the same activity, which sites do most people prefer, and why?

Knowledge of this type may prove valuable to managers. If we know more about how and why people actually use an area, it may be possible to adjust or modify its use to meet management objectives, by controlling the physical attributes of the landscape.

There is also, unfortunately, another category of use of urban recreation facilities that needs investigation: their illicit use. This is a large and growing problem in the parks of many major cities. By examining this problem in detail, we hope to provide some assistance to law enforcement officials. In addition, information on relationships between various kinds of crimes and physical attributes of parks may prove important to park planners and designers.

III. Meanings of urban forest recreation areas

The term meaning has a variety of uses, and often means different things to different people. Generally speaking, the meaning of an area or an activity to a particular user will depend on that person's structure of attitudes, values, beliefs, motives, and personality. For example, studies have shown personality differences between participants in different recreational activities (Moss, Shackelford, and Stokes 1969).

Particularly crucial to this concept is what the user expects to find at an area. Expectations, sometimes called aspirations in the recreational literature (e.g. Bultena and Klessig 1969), are beliefs about what will be

present at an area. Understanding these expectations is a first step toward discovering what an area or activity means to people.

Research on the meanings of forest recreation activities and areas will be essentially basic research until more about the functions of such meanings can be discovered. A logical approach is to begin with informal, but in-depth, interviews with participants at recreation sites. From these interviews, more formal instruments may be developed. We expect that they will yield usable management information along the way, especially by finding out more about how users conceptualize forest recreation areas and activities.

IV. Benefits of urban forest recreation areas

The concept of benefits stemming from a particular area or experience i a complex one. To begin with, there are several different types of benefits. Some of the benefits of forested areas are physical: trees and forests in urban areas can modify microclimates (Federer 1971), reduce air pollution (Rich 1971), help in noise abatement (Leonard 1971), and play a role in neutralizing wastes (Sopper 1971).

A second class of benefits is primarily economic. A recreation area ma benefit the local community by stimulating a demand for secondary goods and services, such as motels, gasoline stations, restaurants, etc. In some cases these benefits may be substantial, as they are in many of the communities around the national parks. In most instances, however, such benefits are small (Beardsley 1971).

Tombaugh (1971) has discussed two types of external economic benefits produced by natural environments: existence value and option value. Existenc value is the pleasure people derive from knowing that an area exists, even if they don't plan to use it. Option value is people's willingness to preserve an area because they want to maintain their option to visit it. It may be that option values are especially important in the urban forest.

Another external effect, which may be unique to forests and parks in urban areas, is their influence on property values (Hammer, Coughlin, and Horn 1971; Kitchen and Hendon 1967). In general, these studies have found that parks increase property values, although results differ for properties bordering directly on the parks.

A third type of benefit produced by natural areas in and around cities is the effects they have on their visitors. Some of these effects are physical, such as improved muscle tone from vigorous exercise. Others might be social, such as increased family solidarity, decreased aggressiveness, or increased tolerance of different social groups. Other benefits are psychological, such as learning about the natural environment, the "re-creation" that restores one for work, need fulfillment, or wish gratification.

Research on all aspects of these recreational benefits is extremely important, especially for the urban forest, where suitable lands are rapidly being eroded by subdivisions and other land uses. Fortunately, a number of USDA Forest Service research units throughout the country are studying recreational benefits. We will attempt to coordinate work on the various

types of benefits, and find ways to quantify them in standard units to make them comparable both with each other and with benefits of alternative land uses.

V. Choice of recreational activities in urban forest settings

This topic is basic to the other research topics discussed above. For example, it would be logical to assume that people choose the activity that promises the most benefits to them. These benefits depend on what they expect to find at an area, and upon what these expectations mean to them. However, the choice of activities or areas also depends upon their accessibility. This, in turn, depends on such variables as cost, distance, etc. As a topic for research, therefore, the problem of choice can serve an integrative function by indicating the nature of the relationships between some of these variables. In other words, work on this problem will help us evaluate the relative importance of such factors as accessibility, benefits, meanings, and so forth, in determining how people reach decisions about areas and activities.

Moreover, by understanding the bases of an individual's choice, we should also gain further understanding of the very foundations of recreational demand. This, in turn, could greatly augment our knowledge of the substitutability of different forms of recreation. Unfortunately, because of the integrative nature of this topic, work on it must be delayed until we have obtained positive results from research in the other areas.

CONCLUSIONS

I consider this analysis a starting point for our research efforts; it should not be considered the ultimate word on such ventures. In time as we amass more research results, some of these lines of investigation may prove unfruitful, while added experience will undoubtedly suggest new directions for research. Furthermore, these efforts in recreation research are only a part of the total thrust in the new areas of environmental and urban forestry. Constant coordination with work in other areas will be necessary if we are to attain our goal--building a substantial foundation of knowledge about people and forests that will facilitate the delivery of recreation to residents of the nation's large cities.

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A CRITIQUE OF THE PAPER ENTITLED "URBAN FOREST RECREATION: A STRATEGY FOR RESEARCH"

Philip L. Archibald 1/

Author Tom More's paper is well written and flows in a logical manner through the Abstract, Problem, Topics for Research (giving the proposed research project by the Northeastern Station) and terminating in the Conclusion.

The paper discusses the problems associated with providing increased amounts of recreation for urban dwellers--whose population is rapidly increasing. More pressures are being placed on providing recreation within the urban complexes. He points out that much of the past research and studies on recreation use and problems was focused on the rural areas.

His paper describes the research that will be conducted by the Forest Service's Northeastern Station within the Pinchot Institute for Environmental Forestry. This research work will study the problems and opportunities associated with outdoor recreation only in the Northeast, but assumes that the findings will be applicable to other areas of the country.

The immediate problem that the reader may encounter with More's paper is one of definitions, beginning with his definition of an urban forest. He writes that "This forest, interspersed with buildings, fields, houses, roads, fences, and private holdings, is the urban forest." He later hints that the urban forest is similar to the Interior Department's definition of an urban recreation complex which are areas within 120 miles of a city of 500,000 or more population.

The author defines the urban forest in his paper more in terms of geographic distances from the inner city and by population than in terms of plant cover or uses of the forested areas within urban complexes.

He states that "Access to the forest for recreational purposes will be limited." Yet, if we take his definition of the urban forest literally then those people living in the metropolitan areas are already in the urban forest.

Traditionally, we have thought of an urban forest as an entity within some geographic urban zone in the same category as an urban park, green strip, or developed recreation area--not in all encompassing nature, including homes, shopping centers, and industrialized areas. Perhaps the title of his paper should be "Urban Recreation Complex: A Strategy for Research," since forests are only a piece of the landscape that goes to make up the urban complex mix.

A clearer distinction is needed between parks (which may have trees) and urban or semi-urban forests. The two are mutually exclusive with different clientele, different ecosystems, different uses, and different problems.

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The reader may encounter more definition problems in the discussions of tables 1 and 2 dealing with recreation acreage, recreation land, and urban recreation. The author says that the Northeast contains 100 million acres of fields, marshlands, and woodlots, yet the recreation acreage per capita is only 0.2 acres. Then, "recreation land is even more scarce for residents of metropolitan areas: only 0.04 acres per capita." Evidently USDI, who gave these figures in "The Recreation Imperative," meant the acreage in developed sites within their "urban recreation complexes." Millions of acres of forested lands lie within the "complexes." These acres are available to the urban dweller for both developed and dispersed types of recreation. The reader may also have problems with the title of table 1 in "Public Ownership of Recreation."

On the first page in the Abstract and under The Problem it would be well for the author to state that the proposed research is to learn more about people and how they perceive and use urban forested recreation areas--and not so much about the forest itself.

While there will be more demand for recreation in the urban recreation complexes, his contention that recreation visits to the rural areas are presently declining is false. Recreation use to the National Parks and Forests is at an alltime high and increasing even in this period of rapid inflation and rising prices for gasoline. Perhaps people are taking that "last" major trip or vacation before the energy crunch descends upon them.

Society has certainly overlooked the need to research recreation use, problems, and opportunities in the urban areas especially as it relates to trees and forests. The Pinchot Institute is attempting to correct a small portion of this need. The author has listed many important key questions to which answers are lacking. Research into which recreational activities "buys" the most toward providing the effective supply of needs is important when we consider the billions of dollars worth of urban recreation needs which must be met in the future. The value of the forest, or tree associated, outdoor type recreation will compete for the more costly types of recreational activities--many of which often have high capital investments.

Research has been done on the use that is made of rural recreation areas. Studies at National Forest campgrounds have determined where people go, what they do, what activities they like best, how long they stay, and so on. The same information is urgently needed in the urban recreational complexes. Researchers should be reminded that attitude interviews are for that particular point in time and that these attitudes may change with economic conditions, health, age, and other factors.

While, as the author states, the proposed research project is not all encompassing, research needs which would be crucial to the urban recreation manager are: "How do we keep these urban forests healthy, vigorous, free from deleterious effects and then regenerate them whenever necessary--all in the urban setting?" Studies are needed to determine how much area is needed in urban forests, parks, and greenbelts per 100,000 population--classified by types such as high forest, urban park, mini park, or strips: How much is needed for recreation, amelioration of climate, noise reduction, and esthetics; do we design such areas, either starting from scratch or by redesign? These

are among the questions which the hundreds of State and city urban and community foresters are attempting to answer as they work with urban planning and development associations and commissions in today's world.

TOPIC III

RESEARCH APPLIED TO MANAGEMENT PROBLEMS

ABSTRACTS

ELSNER AND TRAVIS

The Role of Landscape Analytics in Landscape Planning.--This paper defines the emerging field of landscape analytics and discusses some of the more practical aspects of computerized landscape analytics, and relates it to the larger fields of landscape planning and land-use planning. The paper also summarizes some of the more important theoretical systems for dealing with landscape dimensions and measurements, outlines our own work with the VIEWIT system, and makes suggestions for future work in this field.

WAGAR

Achieving Effectiveness in Environmental Interpretation.--To contribute fully to sustained resource benefits, interpretation needs support for recruiting and retaining top-flight interpreters and for research in interpretation. Summaries of existing knowledge and new studies show that interpreters' effectiveness can be improved by (1) defining clear objectives, (2) using attention-holding techniques, and (3) evaluating the extent to which objectives are achieved.

CONVERY

Economics Applied to Outdoor Recreation: An Evaluation.--The uses and limitations of economics for outdoor recreation planners and managers are discussed. Special attention is devoted to the estimation of costs and benefits of providing outdoor recreation, and the extent to which such estimating procedures can be used by field personnel.

LIME

Principles of Recreational Carrying Capacity.--Recreational carrying capacity is a complex and troublesome concept that incorporates principles of the social as well as the physical and biological sciences. There is no magic number that is the capacity for a given recreation site. Deciding how much and what kind of use is acceptable for an area must be based on managerial judgment and experience. The uncertainty of such decisions can be substantially reduced by a consideration of the interrelationships of (1) management objectives, (2) recreation user attitudes, and (3) impacts of recreation use on natural resources. Some basic principles, based on a review of the current state-of-the-knowledge, that relate to carrying capacity and that seem relevant to outdoor recreation management are discussed.

HENDEE AND POTTER

Hunters and Hunting: Management Implications of Research.--Data are summarized from 33 studies pertaining to hunting participation--hunter characteristics including age, education, occupation, income, residence; hunter motives; membership in sportsmen organizations and reading of sporting magazines; antihunting sentiment; and nonconsumptive wildlife use. These data are interpreted for implication about the future importance and nature of hunting and wildlife management. The authors see the continued importance of hunting but perhaps at reduced levels. The provision for the integration of opportunities for both hunting and wildlife appreciation are an important resource management challenge.

THE ROLE OF LANDSCAPE ANALYTICS IN LANDSCAPE PLANNING

Gary H. Elsner and Michael R. Travis[1]

Abstract.--This paper defines the emerging field of landscape analytics and discusses some of the more practical aspects of computerized landscape analytics, and relates it to the larger fields of landscape planning and land-use planning. The paper also summarizes some of the more important theoretical systems for dealing with landscape dimensions and measurements, outlines our own work with the VIEWIT system, and makes suggestions for future work in this field.

Additional keywords: Landscape analytics, landscape planning, land-use planning, computer models, analysis methods, landscape research.

INTRODUCTION

This paper introduces and discusses several of the components of the emerging field of landscape analytics. Landscape analytics is concerned with the development of quantitative information about the landscape as contrasted with quantitative information about people's perception or satisfaction relative to the landscape. But before discussing how landscape analytics are related to landscape and land-use planning, we need to touch on the role of landscape analytics in landscape research; the distinction between landscape analysis that is done with respect to an observer and analysis that is done without respect to an observer; and the differences between computerized and manual analysis.

LANDSCAPE MANAGEMENT RESEARCH

Framework

To facilitate more precise communication concerning Forest Service landscape research programming, a team[2] of Forest Service researchers met in San Antonio, July 7-11, 1975, to develop a conceptual framework for Landscape Management Research (fig. 1). This framework delineates distinct landscape research areas, and clarifies their relationships to land-use planning.

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[2] Team members were: R. O. Brush, B. L. Driver, H. E. Echelberger, G. H. Elsner, R. G. Lee, R. B. Litton, A. W. Magill, and E. L. Shafer.

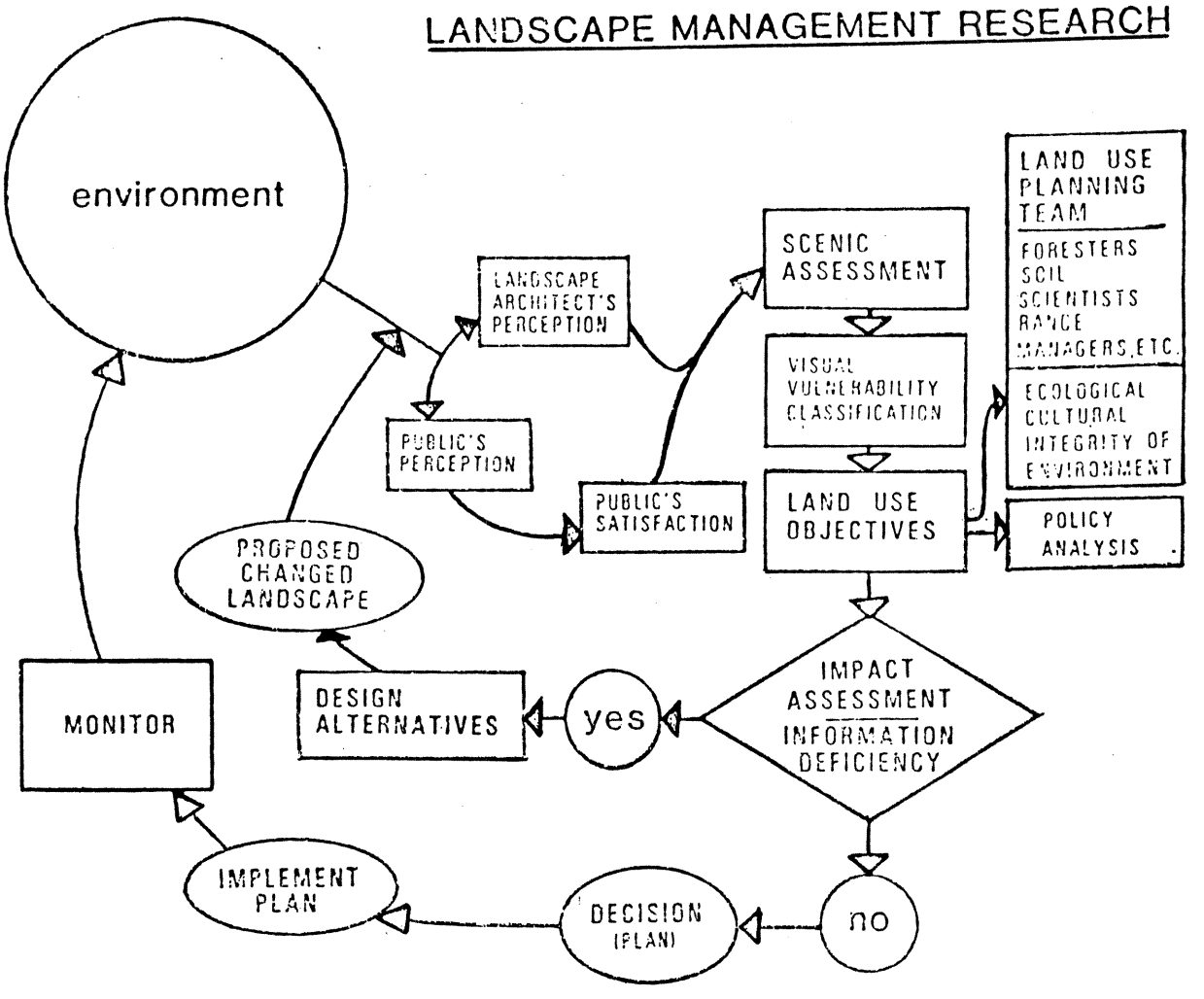

Figure 1.--A conceptional framework for landscape management research by the U. S. Forest Service.

The broad areas for landscape research are described by these titles:

Public perception

Public satisfaction

Landscape architect's perception

Scenic assessment

Visual vulnerability classification, which is sometimes termed visual absorption capability (Litton 1974)

Land-use objectives

Design alternatives

Plan implementation

Monitoring activities (Litton 1973)

The land-use planning activity shown in the framework provides both an emphasis to the importance of landscape analysis and a means of attaining and monitoring esthetic values. This landscape research framework was designed to conform to generalized land-use planning procedures, which include all those elements from the statement of land-use objectives and goals, through definition of alternatives, to impact assessment, plan implementation, and monitoring. Therefore, the correspondence between elements in the landscape research framework and similar elements in the planning process can be used to judge the effectiveness of new information or new technology developed by landscape researchers. By helping to define and quantify the basic dimensions of the landscape, the field of landscape analytics contributes to improved communication and understanding in each of these areas.

Alternative Categorizations

This framework is not intended to be the final answer to categorizing landscape research. In fact, several alternative categorizations have already been proposed. For example, Wagar (1974) has defined three categories for studies of landscape quality: (1) physical descriptions, (2) judgments of quality, and (3) analyses of psychological dimensions involved in landscape preferences. And the Environmental Protection Agency (EPA) commissioned an important review of esthetics in environmental planning (Washington Environmental Research Center 1973).[3] This review defined and utilized the following categories for visual and user analysis methods:

[3] The report for the EPA reviews a number of selected methods and includes a fairly comprehensive reading list.

Visual Analysis Methods

1. Numerical systems for visual analysis--comprehensive environmental analysis

2. Numerical systems for visual analysis--independent esthetic assessment methods

3. Non-numerical visual analysis methods

User Analysis Methods

Methods of visual analysis are those tools used to identify esthetic attributes, to forecast changes in the attributes, and to describe the implications of changes for the environment. Methods of user analysis are used to evaluate individual preferences for esthetic stimuli. The three methods of visual analysis defined for the EPA depend upon whether esthetic characteristics are assigned numerical values or are only ranked. If a method attempts to relate esthetic considerations to other environmental considerations, it is termed a "comprehensive environmental analysis method." If the method is designed to assess esthetic impact as an independent environmental consideration, it is termed an "independent esthetic assessment method" (Washington Environmental Research Center 1973, p. 41).

While these categorizations are helpful in understanding landscape research, they do not clarify its relationship to land-use planning nor depict the difference between those methods which may be designed and used by the planner or landscape architect and those which may be used by the general public.

The rest of this paper is concerned chiefly with computerized landscape analytics or those methods and measures which would be termed "Visual Analysis Methods: numerical systems for Visual Analysis--independent esthetic assessment methods."

Analyses of Visual Quality Characteristics

Most applied approaches to landscape analysis seem to place some importance upon first determining which areas of the landscape comprise specific landscape scenes or visible areas (Lovejoy 1973). And the scene delineation is often treated in a multiple form; that is, not from a single observer point, but from many points defining a highway route or from many frequently visited points in the landscape.

An elaboration of this concept is employed in the Forest Service's Visual Management System (VMS) for setting visual quality objectives (USDA Forest Service 1974). This approach of first determining seen areas or landscape scenes and then determining and mapping characteristics of those seen areas is clearly depicted by Zube and others in their Connecticut River Valley Study (Zube and others 1974). This approach is particularly appropriate for analyzing visual impact from specific land-use proposals as they occur; that is, for dealing with unpredictable demands upon the landscape. But in many long-range

planning processes, such as VMS, it is also necessary to identify and map visual quality characteristics independent of whether the area comprises a specific landscape scene or not. It is reasonable to expect therefore, that those computerized landscape analysis systems that provide both kinds of capabilities would receive the widest usage.

MANUAL LANDSCAPE ANALYTICS

Manual approaches to landscape analysis are well established and have been in practice for many years (Litton 1968). Additionally, some of the same techniques of manual view delineation have an even longer history in the planning of forest fire lookout systems. Procedures for producing visibility maps by field sketching have been well documented since at least 1931 (Shank 1931). Manual profile, photographic and relief-model methods for producing visibility maps for planning forest fire lookout systems were published in 1937 (Show, Kotok, and others 1937).

Although computerized methods for view delineation have been available for some time (Amidon and Elsner 1968), more advanced computerized approaches to these and other problems have only recently received widespread usage. The CLA system developed by the Forest Service is the VIEWIT system (Amidon and Elsner 1968), (Elsner 1975), (Travis, Elsner, Iverson, and Johnson 1975). This large-capacity, visual-analysis system was designed to complement several other Forest Service systems, including TOPAS (Topographic Analysis System). The VIEWIT system was reviewed in the EPA report (Washington Environmental Research Center 1973) and compared with the manual methods developed by Leopold (1969)[4] and by Burke and others (1968) using five different criteria. The summary table (fig. 2) from the EPA report is informative and useful but somewhat arbitrary--it could be expanded both in its list of relevant criteria and in the systems to be compared. Moreover, the VIEWIT system can now handle larger planning areas and has many more options than in 1973.

COMPUTERIZED LANDSCAPE ANALYTICS

The previous discussion has given an idea of what computerized landscape analytics is and how it differs from other parts of the landscape planning and management job and in general how it relates to the job of land-use planning. This section will discuss in some detail the situations in which CLA is appropriate, CLA audiences or user populations, the types of landscape dimensions which can be incorporated into CLA, and a sample of the specific computational capabilities of the VIEWIT CLA system.

Application Criteria

Any manual landscape analysis involves considerable time, often solely by landscape architects. And any CLA application involves a commitment of experts in data handling and landscape architecture, as well as computer processing

[4] A more detailed discussion of Leopold's method has been published recently in the Journal of Leisure Research (Hamill 1975).

costs. It seems relevant, therefore, to consider carefully some of the advantages and disadvantages of the proposed computer application. These eight broad considerations supplement the five criteria illustrated in figure 7:

1. Are visual resources of great importance in the proposed project or land-use planning activity? Will they have major or significant effects on decisions?

2. Can the visual analysis be handled through other means with less investment?

3. Does the user have access to a high-speed printer terminal or small demand terminal? If not, can the user work with the turn-around time involved in mailing input and output data from other offices? Or can work be handled by short details of individuals to such offices?

4. Do several alternative land-use plans need to be evaluated?

5. Is there high potential for future use of the input data after its initial usage? For instance, would there be possibilities of power transmission, road, timber sale, electronic relay site, etc., proposals within this land unit?

6. Will computer-generated output be accepted or required by management and the public as valued information for decisionmaking. Will quantitative estimates of visual impacts of alternative land uses be useful in developing land use or project plans?

7. Is there a need for consistent and repeatable analyses? Is the required level of detail or the land area so extensive or the number of observer points so large that manual analyses would consume an inordinate amount of time?

8. Is the topography of the area complex, i.e., does it contain hilly or mountainous zones which would make manual landscape analysis very time consuming?

User Groups

Essentially any organization that is responsible for managing large areas of land with significant visual resource values may want to consider using CLA. If the land is also subject to frequent development pressures or use demands or both, then a computerized analysis system may help save time and money. The groups which we have worked with on the VIEWIT system include associations of metropolitan governments, universities, and Federal land management agencies such as the Forest Service, National Park Service, Bureau of Land Management, and the Army Corps of Engineers (Travis and others 1975).

Criteria	Leopold's uniqueness study (numerical scale)	Burke (photographs)	VIEWIT (computerized)
(1) Generated from public experience not developers biases	(-) Subjective selection of preferred characteristics	(-) Developers biases define beauty and interest	(+) Totally objective, only areas physically visible are computed
(2) Full range of aesthetic attributes	(+) Aesthetic factors considered in detail, good range	(+) Full range indicated	n.a. Objects not described
(3) Variables appropriate to scale and purpose of system	(+) Site related	(+) Views by zone--corridor related	(+) Site related
(4) Primary aesthetic and secondary aesthetic impacts considered	(-) Primary only	(-) Sensitive areas not adequately described	n.a.
(5) Measured against established reference point	(-) Ranked independently	(-) Characteristic landscape not described well	(+) Is it visible or not
(6) Straightforward and easily reproduced	(+) Data appropriate and adequately described	(+) Photos primarily	(+) Topo map reading and computer data
(7) Output easily communicated	(-) Ranking criteria not explained well	(-) Subjective values predominate	(+) Informative but limited in usefulness

Source: Washington Environmental Research Center (1973)

Figure 2.--A numerical system for visual analysis (independent esthetic assessment) compares an early version of the VIEWIT computerized technique with manual methods developed by Leopold (1969) and Burke (1968). (-) indicates that the system does not satisfy corresponding criteria. (+) indicates that the system satisfies criteria adequately.

Quantitative Landscape Dimensions

The basic and most useful reference in identifying landscape dimensions is Litton's (1968) report, even though it is not oriented towards computerization. In a more quantitative approach to the problem, Zube and others (1974, p. 37-45) have reviewed the literature and identified six major categories of landscape dimensions: landform, land-use area, land-use edge, land-use contrast, water, and views. And for each category, they have suggested alternative measurements, which are calculated manually (p. 163-180). The landscape dimensions and alternative measures are:

1. Land form

    Relative Relief Ratio
    Absolute Relief Ratio
    Mean Slope Distribution
    Topographic Texture
    Ruggedness Number
    Spatial Definition Index
    Mean Elevation

2. Land-Use Area

    Land-Use Diversity
    Naturalism Index
    Percentage Tree Cover

3. Land-Use Edge

    Land-Use Edge Density
    Land-Use Edge Variety
    Land-Use Compatability

4. Land-Use Contrast

    Height Contrast
    Grain Contrast
    Spacing Contrast
    Evenness Contrast
    Naturalism Contrast

5. Water

    Water Edge Density
    Percentage Water Area

6. View

    Area of View
    Length of View
    Viewer Position

VIEWIT Calculation of Landscape Dimensions

This section summarizes the VIEWIT system's capability of computerizing several measurements of land form and view as well as combine the analyses with independent calculations of the remaining landscape dimensions or with other resource characteristics. The relationship of some of these basic calculations to the job of assessing landscape resources has been detailed by Iverson (1974).

Two types of landscape dimension calculations are currently used: in one, a single number is calculated for a viewed area; in the other, a number is calculated for each cell of the landscape to produce a map of results. Generally, Zube's method follows the first approach, while VIEWIT provides both capabilities. VIEWIT provides a map overlay, summary tables, and statistics for each measurement, and has an option for outputting these results for combining with other data.

View Calculations

Area of View

The VIEWIT system calculates the area of view from one or more points. The results may be displayed on tables in terrain cells, square miles, acres, or hectares or on overlay maps in numeric or gray shade form.

Aerial View Analysis

The seen-area analysis can be computed from a point either above or below the actual land surface. Thus, it can simulate the view from or of a proposed elevated structure, or a proposed surface mining area or, with a number of observation points, the view from a helicopter or airplane in flight.

Times Seen Analysis

The area of view may be determined from a single observation point or from several observation points. In this latter case, the number of times cells can be seen is recorded. These results can be displayed as a number or as a percentage of the total number of observation points.

Length of View

The maximum length of view can be determined quickly by examining the overlay map of the view area.

Viewer Position

Observer or viewer position is a term defined by Litton (1968, p. 5-10) to describe the location of the observer as to the viewed landscape. If the observer is below the surrounding landscape, the position is "inferior"; if the observer's level line of sight generally coincides with the dominating elements of the landscape, then the position is "normal"; and if the observer is located

above the bulk of the viewed landscape, the position is "superior."

With the VIEWIT program the user may specify that seen-area analysis be performed with respect to any one of these three observer positions.

That proportion of the visible landscape which is situated above the observer's level line of sight (i.e., observer inferior position) can be calculated by setting two vertical angle controls. For example, when the level line of sight is treated as 0°, these controls would be placed at 90° and 0° for the observer's inferior position. Similarly, the visible landscape below the level line of sight (i.e., observer superior position) can be calculated by setting these control angles at 0° and -90°. And a range around the level line of sight (for the observer normal position) can be calculated by setting the angles at 15° and -15°.

View Area--Weighted by Distance

Another option allows the visibility of a cell to be weighted by its distance from the observer. To do this the user specifies the distance weighting function most appropriate for the current analysis. Rather than have a limited set of distance functions available to the user, the system allows the user to define any function. This combination of seen area weighted by distance (Yajima 1968) may, of course, be determined from many observation points with the same distance weighting function. Or the weighting function may be changed for different viewing points.

Relative Aspect Analysis

Relative aspect is a measure of the orientation of a visible cell with respect to the observer. Each cell is assigned a maximum of 10 points, and is scaled according to the magnitude of the relative aspect. For example, a cell seen head-on will receive a weight of 10. But if a cell is turned partially away from the observer so that its apparent area is only one-half of its actual area, it will receive a weight of five points. This analysis can be carried out for multiple observer points. Either the average or the maximum of the relative aspect weights combined with the times seen calculations can be computed.

View Area--Weighted by Relative Aspect and Distance

Either relative aspect or distance weighting or both can be used for any observer point or points in a series of visibility analyses.

Land Form Calculations

Absolute and relative relief measurements are computed directly from the elevation data. The elevation data can be portrayed by the VIEWIT system either as a coded overlay map that shows the elevation for every cell or as a gray-shaded map with higher elevation shaded in darkest tones.

Absolute Relative Relief

The absolute relative relief measurement is the standard deviation of the visible elevation data.

Relative Relief Ratio

The relative relief ratio is calculated by dividing the absolute relative relief by the area of view.

Mean Slope Distribution

Slope information can be calculated and produced either as overlay maps or as table information. The slope classes may be defined either by standard 10 percent classes or by any set of classes the user specifies. The mean slope distribution is then simply the average of the number of acres or hectares of land in each slope class.

Absolute Average Elevation Change

With this measurement the average elevation of the eight cells around each cell is computed. And the ratio by which the elevation of the cell differs from this average is recorded.

Aspect

Aspect is the primary direction in which the land form slopes. Aspect is calculated by the computer by first finding the best fit plane to approximate the slope of the terrain and then determining its principal compass direction. Aspect may be calculated and displayed in a variety of ways including 10° or 45° segments ordered clockwise or both clockwise and counter-clockwise from a specified direction. Since the user may specify any aspect, the option may be used to produce gray-shade maps, with darkest shades showing those areas which have an aspect nearest to the specification. For example, northeast maps may be produced to identify snow retention for ski runs or water retention for revegetation, or southeast aspect maps for the morning sun preferred for campgrounds. Several aspect maps from different directions give additional insight into the shape and orientation of the land form.

Summary Statistical Measurements

Several standard statistical measurements can be computed from either the basic elevation data or the results of slope, aspect, and other options. These measurements include the mean, minimum, maximum, variance, standard deviation, skewness, and kurtosis. Standard deviation is a measure of absolute dispersion or spread of the data. Skewness and kurtosis are measures of relative dispersion. Specifically, skewness is a measure of the degree of asymmetry. And kurtosis is a measure of the degree to which the distribution of the data is peaked.

The Future for Landscape Analytics

Clearly, current research and development emphasis in landscape analytics is largely on identifying and defining landscape dimensions which can be calculated either manually or by computer and in evaluating and comparing alternative measurements for each dimension. We expect that this type of exploratory and evaluation work will need to continue for some time.

Research and development efforts beyond this will probably focus upon evaluating the practicality of estimating and utilizing indexes of landscape quality and user preference and preference functions for landscape esthetics. These efforts would be similar but more detailed than those described in a recent paper on illustrative preference functions for water esthetics (Gum and others 1974, p. 42-50). The next steps will probably be related to developing and evaluating the usefulness of production functions for landscape esthetics, which may or may not be stated as joint production functions with other forest outputs.

As worthwhile landscape analytic techniques are developed, researchers and managers will continue to work together to incorporate these ideas into planning processes.

SUMMARY

Because of the many talented and original minds now at work on landscape analytics, significant developments continue to be published at a steady rate--both in the United States and throughout the world. It is likely to be some time, therefore, before anything like a comprehensive treatment of this dynamic and important field becomes possible. This discussion of some of the more practical aspects of computerized landscape analytics has defined the subject, related it to the larger fields of landscape planning and land-use planning, summarized some of the more important theoretical systems for dealing with landscape dimensions and measurements, outlined our own work with the VIEWIT system, and made some suggestions for future work in this field.

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A CRITIQUE OF THE PAPER ENTITLED "THE ROLE OF LANDSCAPE ANALYTICS IN LANDSCAPE PLANNING"

Robert H. Stignani[1/]

This paper essentially presents an up-date or state-of-the-art discussion which is most informative to those having a continuing interest or familiarity with the subject. Several aspects of this paper surface as outstanding strengths in an area long in need of clarification. The presentation of this subject in a manner that is readily understood by non-research oriented managers is in itself a strong point.

A basic problem related to research has been that of tracking the thread of continuity through to management application. The graphic portrayal of a conceptual framework for identifying landscape research areas is a significant effort to clarify this frequently obscure connection. Perhaps it might have been of value to expand upon this aspect of the paper, identifying specific examples of the research area correlation. "Visual vulnerability" might have been broken down further, for purposes of illustration, to measurements of slope, site regeneration capability, vegetative screening, etc. This point is, however, secondary to the primary topic.

Although the authors indicate that a totally comprehensive treatment of the subject is not possible due to the rapid advances being made by many researchers, the discussion under "Alternative Categorizations" was of help in comparing various research approaches.

A main thrust of the paper deals with computerized landscape analysis and builds a fairly strong case for use of the VIEWIT method. The concise and straightforward manner of presentation should cause the land manager little difficulty in determining whether or not to utilize a computerized analysis approach, and what quantitative landscape dimensions can be treated or interrelated.

This critique was based primarily on an earlier draft of the paper. It included references to program "user commands," undefined statistical terminology (e.g., standard deviation), and failed to cite examples of practical application for calculated landscape dimensions. The earlier draft also did not adequately define the term "landscape analytics" and establish the need for its use in lieu of the more familiar "landscape analysis." The subsequent revision recognized these shortcomings, and the several changes contribute to the improved communication which characterizes this paper.

There were a few areas that might have been expanded. Little if any reference is made to data input needs or alternative methods to secure input for the VIEWIT system. In a discussion of this nature, it might have been of

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value to include a flow diagram or sequence of steps leading to a management decision-related output as a summary or overview of the VIEWIT method.

Most managers with varying backgrounds and knowledge of VIEWIT or similar topographically based computerized analysis programs might benefit from further mention of the constraints which either are inherent or have yet to be resolved. Such factors as vegetative cover, particularly where heights of timber vary considerably, minimum application considerations, both in terms of elevation differences and project scope, and accuracy constraints established by input data should be important in this type of discussion.

Although the authors make no claim in this regard, it perhaps should be pointed out that computer systems provide no decisions or subjective judgments. The process or "tool" is only an aid in decision-making, by providing the manager a more factual basis for which to make his subjective value judgment.

In their look ahead, Elsner and Travis conclude that it will be necessary to continue, for some time, to identify or define new calculable landscape dimensions and explore and evaluate their alternative measurements. This reviewer is optimistic that researchers will not become overly engrossed with this phase of this rapidly emerging field before charging ahead with other investigations along a broader front. The mere reference to "indexes of landscape quality and user preference" and "joint production functions (for landscape aesthetics) with other forest outputs" whets the appetite of land planners and managers.

ACHIEVING EFFECTIVENESS IN ENVIRONMENTAL INTERPRETATION

J. Alan Wagar[1/]

Abstract.--To contribute fully to sustained resource benefits, interpretation needs support for recruiting and retaining top-flight interpreters and for research in interpretation. Summaries of existing knowledge and new studies show that interpreters' effectiveness can be improved by (1) defining clear objectives, (2) using attention-holding techniques, and (3) evaluating the extent to which objectives are achieved.

Additional keywords: Resource management, recreation, environmental education, conservation, evaluation.

THE SITUATION

Environmental interpretation--such as that found in visitor centers, interpretive trails, and talks by naturalists--has grown increasingly important in recent years. One reason is the great opportunity interpretation offers for increasing human enjoyment without increasing human impacts on resources. Many recreationists are delighted by interpretation that helps them understand the places they visit--for example, how people really lived in some other era (as at Colonial Williamsburg), how cave salamanders harness solar energy (as at Blanchard Springs Caverns), or how a geyser works (as at Yellowstone).

Growing public concern with environmental problems has also contributed enormously to the importance of interpretation. Not only do people recognize increasingly that sound resource management is essential for their future well-being, they also insist increasingly on participating in decisions about environment. Environmental interpretation can improve the quality of these decisions by helping people understand the dynamics of the ecosystem on which we all depend. As the complexity of environmental management increases, such understanding is increasingly essential for responsible citizenship.

The fundamental challenge to environmental interpretation, like the fundamental challenge to all other resource management, is to increase the sustained flow of benefits our resources provide for people. The problems that need to be addressed by research in interpretation are those things that prevent interpretation from contributing fully to this sustained flow of benefits.

Two kinds of problems limit the effectiveness of interpretation: policy problems and technical problems. Although researchers do not set policy, they can often help identify policy bottlenecks and make the policy-maker's task easier. Technical problems avoid most of the value judgments inherent in policy matters and are therefore much tidier and more "scientific".

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However, we can't expect technical solutions to problems that are rooted in policy.

The major problem facing interpretation is the lack of support it receives within the agencies that administer a lot of the resources that lend themselves to exciting interpretation (Oltremari 1974). Several factors contribute to this. Perhaps the most important is that the training, job assignments, and incentives of most resource managers make them perceive themselves as specialists dealing primarily with physical resources rather than with human well-being. Public contact and the direct production of public enjoyment therefore tend to be considered incidental or as by-products permissible only to the extent that they don't interfere with "normal" resource management.

These attitudes are inestricably tangled with other factors. From our Puritan heritage there lurks a lingering distrust of anything so frivolous as the direct pursuit of pleasure. As a result, the enjoyment provided by interpretation usually goes under such serious sounding labels as "enrichment" or "enhancement" of visitor experiences. Often enjoyment is overlooked altogether, and interpretation is portrayed instead as a means to some other end, such as convincing people to use resources more wisely or convincing them that controversial management procedures are"correct".

Limited appropriations are often cited as the reason some things don't happen. These are a factor, especially lately. But, because of long standing value orientations, agencies that give high priority to their traditional work tend to give rather low priority to interpretation.

Perhaps another factor is simply that our philosophy of land use is still highly fragmented. Specialists often see their objectives as producing specific classes of products. If we ever get our land use philosophy all together, we'll discover that these products are means to sustained human benefits, not ends in themselves. On that glorious day, managers of public resources may be found derelict in their duty if they default in making resources yield the full measure of benefits for which they are suited, including benefits available through interpretation.

WHAT WE HAVE LEARNED

Research in interpretation has concentrated on four matters: recruitment and career ladders for interpreters, the role of objectives, gaining and holding attention, and evaluation of effectiveness.

Recruitment and Career Ladders

As one step in addressing the policy problems faced by interpretation, a study was launched to examine the ways interpreters are recruited, trained, and utilized in the Forest Service and National Park Service (Oltremari 1974). This was prompted, in part, by a suspicion that, during a buyer's market for

talent, agencies were not recruiting and utilizing the best available people for interpretation.[2/]

Some important patterns emerged. The interpreters sampled had most of their training in what to interpret and practically none of it in how to interpret. The preponderance of respondents in both agencies had concentrated their college coursework in such life and earth sciences as biology, botany, zoology, and geology. The next most common area was social science, followed by resource or land management. Although most respondents had taken at least one course in speech, few had taken such communications courses as journalism, radio and television, or dramatics. Yet they rated such courses as highly desirable preparation for their work.

Recruitment patterns suggested a rather casual approach to selecting public-contact personnel. More than half of the interpreters had been hired by noninterpreters, often with no interview.

Perhaps the most discouraging finding of the study was the lack of suitable career ladders for interpreters in either agency. Less than a quarter of the respondents were sure they would remain in interpretation, citing as reasons both limited agency support for interpretation and better opportunities in other fields. Over half of the respondents said they would have to leave interpretation to get promoted.

As mentioned, research can help identify such bottlenecks to performance as hit-or-miss recruitment and limited career ladders. However, solutions to these problems require policy changes rather than more study. In contrast with these policy problems, which involve what we choose to do and some of the constraints on our choices, technical problems concern how effectively we are accomplishing what we have chosen to do.

In the few studies addressed specifically to interpretation--and in the great amount of related research in education, communications, and psychology--three major points stand out: 1. We need clear objectives that define what we are trying to accomplish. 2. Messages must attract and hold the attention of the audience for whom they are intended. 3. Evaluation is needed to show how well objectives are being achieved.

OBJECTIVES

To be effective means to achieve your objectives. But many interpreters do not state clear objectives that specify exactly what they are trying to accomplish. Or, they often state objectives in such general terms as "interpret the natural and scenic attractions of Horsethief Valley". Although this is a fine statement of intentions, it provides no basis for knowing when the attractions of Horsethief Valley are being effectively interpreted.

[2/] Questionnaires were mailed to the 383 Forest Service people (nationwide) identified as being permanent or seasonal interpretive personnel and the 178 National Park Service people (Pacific Northwest Region only) identified in similar positions. Response rates were 85.6 percent for the Forest Service and 73.7 percent for the National Park Service.

To facilitate evaluation, we can borrow the idea of behavioral objectives from the educators (Mager 1962). Behavioral objectives specify what a student--or visitor--should be able to do as a result of a presentation. An example would be: "After hearing the naturalist talk at Horsethief Valley, the visitor should be able to name and describe the three major forces that shaped the valley". Accomplishment of this objective can be tested by conversation with the visitors or by occasional questioning.

Because behavioral objectives tend to focus on such fine points that broader goals could be overlooked, we can develop a pyramid or hierarchy of objectives (Putney and Wagar 1973). In this, each broad goal is supported by several specific objectives which, if achieved, contribute toward accomplishment of that broad goal. Each of these specific objectives may in turn be supported by several even more specific objectives to provide a pyramid with three or possibly even more layers. When objectives are stacked in such a hierarchy, demonstrated achievement at the most specific level permits us to infer similar achievement of broader goals, even if such goals are not suited to direct evaluation.

In developing objectives, we must not overlook what motivates our audiences. Instead of seeking information, many visitors to interpretive programs are simply engaged in an open-minded search for new and enjoyable experiences. In our closeness to the objectives of the organizations we serve, we must not concentrate on what we want people to know without considering why in the world they would enjoy knowing it.

AUDIENCE ATTENTION

Once we know in some detail what we are trying to accomplish, we need to get the attention of the audience. Depending on objectives, this may be any audience that comes along--or a very specific audience, such as Mrs. Connolly's seventh graders or perhaps opinion leaders and policy makers.

An obvious first step in gaining attention is to present our story where the people are. Yet this is not always done. For example, visitor centers are sometimes built out of sight of or even miles from heavily traveled roads.

Sometimes presentations are given where visitors will not stop or notice them. For example, at the Marine Science Center in Oregon, excellent exhibits are often ignored because they are on walls behind visitors who are watching the live fish. To reach people, information must be offered at the right times and places to be easily noticed.

Introductory Techniques

A number of introductory techniques are useful for gaining attention (Boulanger and Smith 1973). One is to offer valuable knowledge or skills. For example, a presentation might begin with: "What would you do if, while hiking, you found the trail blocked by a bear with two cubs?" Or it might begin with a discrepant or seemingly self-contradictory statement that arouses curiosity and requires explanation. For example: "This forest was created by a forest fire", or "The nearest formation of rock like this boulder is over 50 miles away". TV ads are full of discrepant events used for attacting attention.

Making Material Interesting

To hold attention, a presentation must be interesting. Interest depends on both the subject matter and the way it is presented. One study of exhibits showed higher visitor interest in violence and violent events than any other subject category (Washburne and Wagar 1972). This is nothing new. Plays and myths dating back thousands of years show that storytellers and entertainers have probably always known that violence is interesting. Fortunately, natural environments abound in violent stories that can be told in a tasteful way.

Although such subject categories as violence, animals, and ecological relationships are predictably interesting, the pattern of presentation is often more important than the specific subject matter.

Audience Benefit/Cost Ratios

For greatest effectiveness, communication and interpretation must have a good payoff and minimum hardship for the intended audience. In other words, to pay attention, the audience needs a good benefit/cost ratio. We must think about payoffs in the audience's terms. Sometimes we become so obsessed with the payoff to the organization we serve that we overlook the payoff to the people we are trying to reach.

Rewards or payoffs can take many forms. For the visitor who is already motivated to want information, such information is rewarding all by itself. Other visitors need a much larger vehicle of entertainment with a much smaller load of information. For example, Disneyland's Journey Through Inner Space was developed on behalf of a corporation at enormous cost. Yet the visitor's experience of penetrating first a snowflake, then a molecular lattice, and even an atom within an ice crystal, is almost pure entertainment. Toward the end of the experience he is told only the name of the corporation, the fact that it is in the business of rearranging molecules, and that he may see a few of the company's products on the way out if he chooses.

In a study of four visitor centers, average visitor interest was highest for dynamic presentations that included such things as motion, recorded sound, and shifting lighting. In contrast, interest was lowest for inert presentations of mounted photos and written labels. Yet such flatwork exhibits are probably the commonest of all. The contrast between dynamic and inert is also very close to the contrast between the media used for entertainment (usually rewarding) and those used for education (often uncomfortable) (Travers 1967, Washburne and Wagar 1972).

Psychologists have found that getting the right answer to a question is rewarding (Deterline 1962). This is the basis for teaching machines and programmed instruction. As one application of this, we developed a programmed nature trail in which visitors were asked a question at the bottom of each sign and then were given the right answer on the next sign. Children remembered more from these question-and-answer signs than from the usual signs.

One of the most rewarding things is simply having an effect when you do something. One study used a recording quizboard on which visitors answered four questions by pushing buttons (Wagar 1972). Each time a correct button

was pushed, a "correct answer" panel lighted up and the visitor was presented with the next question. The quizboard--the only exhibit in the building that could be manipulated--became a favorite exhibit for children the moment we installed it.

The rewards of interpretation may be appropriate ends in themselves. But if rewards are intended as means of increasing understanding, they must be used carefully so that they help rather than hinder. For example, at the Chicago Museum of Science and Industry, most of the exhibits provide for visitor participation. But the day I visited, school groups were running about almost randomly twisting knobs, pushing buttons, and yanking handles but paying little attention to content. For the best learning we must make rewards contingent on such learning.

Persuading the Audience

When communication is designed to persuade, several principles are important (Dick et al. 1974). First, people are the most receptive to messages from sources or speakers they consider credible (i.e., trustworthy, intelligent, well-informed). Persuasion increases if the speaker first says something people in the audience agree with on some matter of importance to them. Greatest persuasion results when the audience is led to a new opinion in a series of small steps rather than a few big ones. For greatest persuasion, a message must not only arouse needs in the audience but also must provide a means for meeting such needs. When the audience will be exposed to contrary arguments, presentations that give both sides are the most persuasive. Finally, after people have been persuaded, discussion with others who have also been persuaded tends to prevent backsliding to the original opinion.

Making It Easy

As mentioned, the effectiveness of communication depends on costs to the intended audience as well as rewards. We can make our communication procedures easy on people by using familiar words and examples, avoiding difficult reading materials, tailoring presentations to the audience, and providing messages with a meaningful structure.

Word usage is important. Language is simply a signal system using symbols that have agreed-upon meanings among a specific group of people. Words are symbols, and full meanings really grow out of people's experiences. For example, do you recall specific places and events when reading the words "the sudden tug of a fish taking the bait", or "skipping rocks across the smooth water", or "the trusting grip of a child's hand"? The memories triggered by words can provide thousands of times as much information as the words themselves. The most powerful words are those that tap the most widespread sets of similar memories and associations among your audience.

But interpreters must often communicate with people whose memories, thought processes, and word associations are quite different from theirs. The most effective interpreters are those with a knack for translating meanings from one system of symbols (often the scientist's) into another (the visitor's). For example, at the Forestry Commission's Mays Wood Forestry Centre in England, the wood properties of different tree species are interpreted with wooden buckets, spoons, hockey sticks, etc. that visitors either have used or

could readily visualize themselves using.

Most visitors find listening easier than reading, and recorded sound has been associated with high visitor interest in several studies (Mahaffey 1969, Washburne and Wagar 1972). With recorded sound, as with a real live interpreter, visitors can listen to information without looking away from main attractions (Erskine 1964). Rather detailed information can often be presented without visitor fatigue. If desirable, sound effects and dialog can be used to provide realism or drama.

In a study on a nature trail, cassette tapes were extremely well received, especially when total length for the 12 stations was limited to 16 minutes. For a 22-minute tape, a few visitors said the pace was too slow and that they would prefer a booklet permitting them to scan quickly to the information they wanted without waiting to hear it on tape.

For people on vacation, reading may not seem worth the effort. At Yellowstone, for example, McDonald (1969) found that only about 10 percent of the visitors stopped at wayside exhibits, and less than half of them read the signs. In a museum setting, Shiner and Shafer (1975) found the average time visitors looked at or listened to various exhibits to be from 15 to 64 percent of the time required to read or listen to the complete message.

When reading materials are used, they should be readable. In general, short sentences with little words are easier to understand than long sentences with big words. Formulas for determining levels of readability have been available for many years (Flesch 1949). However, many interpretive materials are still very difficult reading (Hunt and Brown 1971).

Fitting Presentations to Audiences

Because different people have different interests and backgrounds, interpretation needs to be tailored to the audience at hand. For example, children of different ages have quite different patterns of behavior and learning (Machlis and Field 1974). Yet how many interpretive presentations even recognize that children are different from adults? A preschooler (2 to 5 years old) tends to have a short attention span, to be dependent primarily on the person caring for him, and to be interested in such basic concepts as "big" and "small." At early school age (5 to 9 years old) children become increasingly interested in comparisons (20 of these to equal 1 of those), become more group oriented, and have incredible amounts of energy. In the preadolescent years (9-12) children tend to be more concerned with skills and things than with ideas. Active participation in such "living history" as grinding corn or making pots can be exciting and meaningful to them. At adolescence (approximately 12 to 17 years old) young people usually become increasingly concerned with ideas and with independence from adult supervision. Among adolescents, teen-aged interpreters might often be more effective than adult interpreters (Machlis and Field 1974).

A study at the Pacific Science Center in Seattle provided a striking example of how interests differ with age. When preferences among themes proposed for future exhibitions were separated by visitor age, a mirror-image contrast emerged (fig. 1) between "computers" (interest decreased with age) and "man's

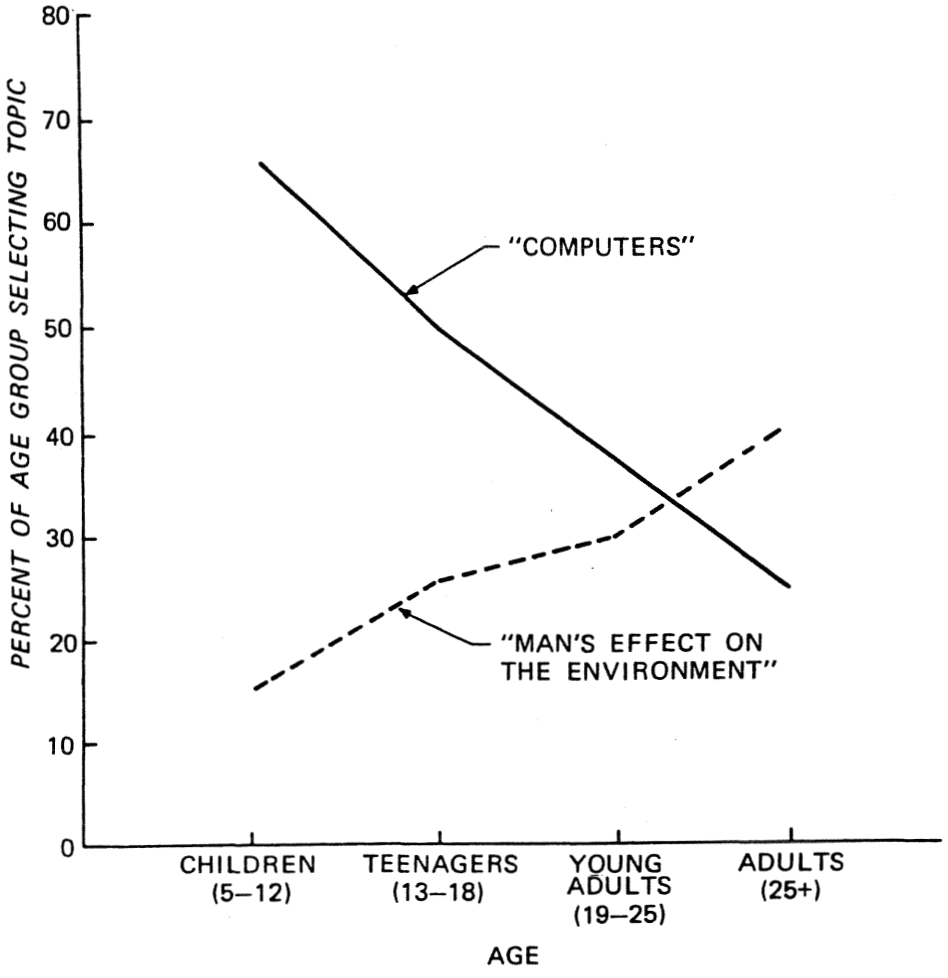

Figure 1.--Effect of age on preferred themes for future "summer specials" at Pacific Science Center.

effect on the environment" (interest increased with age). This parallels other findings that between childhood and maturity, people's interests tend to shift from the concrete and discrete toward the abstract and integrated and from concern with individual things toward relationships and social concerns. Computers are rather awesome machines, associated in many people's minds with highly physical images of spinning tape reels and flashing lights. Also, computers are means rather than ends. By contrast, "man's effect on the environment" is much more abstract, involving social concerns and goals and the integration of diverse processes and factors.

Too often, interpretation is aimed at the nonexistent "average" visitor. Yet information that is too advanced for some people may be overly simple or repetitive for others. In matching information to different groups, an interpreter must consider what knowledge is needed before additional information is understandable (Boulanger and Smith 1973). For example, people

cannot understand how a geyser works unless they already know that the boilin point of water increases with pressure.

Structuring the Presentation

A final factor to consider in holding visitor attention is structure. Visitors need some sort of framework to make information fit together meaningfully. In a study of four visitor centers, visitors were more interested in holistic than fragmented presentations (Washburne and Wagar 1972). Thus exhibits that had parts making a whole story and that gave cause-and-effect relationships received greater visitor interest than exhibits that provided only isolated facts, such as the identification of species.

As another example of structure, Screven (1969, also personal communication 1970) found, in his studies at the Milwaukee Public Museum, that visitor who were given a pretest to find out what they knew before seeing an exhibit remembered more from the exhibit than visitors who received no pretest. Part of this increased recall may have occurred because the pretest warned visitor that they were part of a study. But the pretest also gave them an outline of things to look for. This suggests giving visitors an overview to orient them at the beginning of an interpretive presentation.

Orientation and focusing can also be provided within a presentation. One of the cassette tapes tested on a nature trail asked periodic questions of the visitor. This focused the visitor's attention and increased his retention of the information asked about. However, it decreased retention of information given just before and after a question.

At the Pacific Science Center, cartoon story lines are used to tie science stories together until youngsters learn enough concepts to handle a more scientific structure (Jerry Dotson, personal communication, 1970). The cartoon stories serve another useful purpose: The person giving a demonstration often asks youngsters what would happen if the cartoon character took a given action. If a youngster gives a wrong answer, it's the cartoon character's problem, not his own. This "projective" technique saves the child's ego enough that he'll go right on volunteering answers, right or wrong, without embarrassment.

Other methods of giving structure to a presentation include proceeding from the simple to the complex, proceeding from the whole to the parts, presenting a chronological development, progressing from the familiar to the unfamiliar, moving from the seen to the unseen, and showing increasingly broad application of a principle (Boulanger and Smith 1973).

EVALUATION

Having considered objectives and some ways of accomplishing them, we face the matter of evaluation or feedback to determine how well we are doing. In general terms, feedback is simply a set of signals indicating the extent to which an operation is going as planned and showing what corrective action would be useful. With good feedback, we can emphasize the things that work and improve our presentation, even when we are unsure of the exact reasons for improvements.

Much feedback is available informally, as interpreters watch their audiences, listen to questions asked, and look for other evidence of interest, enjoyment, puzzlement, etc. Such feedback is a major advantage of person-to-person presentations. However, enough visitors will compliment a bad presentation that informal feedback can be misleading as well as helpful.

Strangely, when interpreters substitute formal for informal person-to-person feedback, they usually focus on the speaker or the presentation. However, the effects we strive to achieve can only be observed in the audience.

To avoid questionnaires or interviews that tend to make every evaluation a research undertaking rather than a simple management effort, observational techniques can be used. One technique is simply to observe an audience at 1- or 2-minute intervals to see what percentage of people are watching the speaker or the presentation (Dick et al. 1975). In tests of the procedure, agreement between two observers was excellent (fig. 2). But differences both

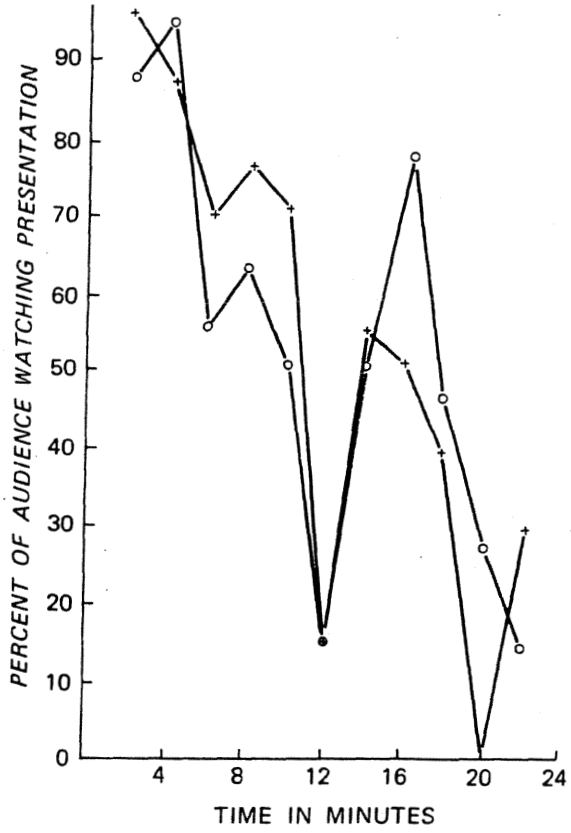

Figure 2.--A "candy-ecology" laboratory presentation. Energy flows among plants, grazers, and carnivores were simulated by the exchange of candy among people participating in the presentation. + = Observer 1. o = Observer 2.

between and within presentations were striking. When the setting permitted, observers watched the eyes of members of the audience. With poor lighting or other conditions that made people's eyes difficult to see well, observers watched the directions people's heads were turned and found no appreciable loss in their ability to discriminate between high and low attention.

Another feedback technique uses self-testing devices that record numbers of right and wrong answers. If we change a presentation and the percentage of correct responses goes up, the change was probably an improvement (Wagar 1972).

Ideally, a presentation should be improved before it is put in final form. Work at the Pacific Science Center to evaluate an energy exhibition while it was evolving showed that "quick and dirty" techniques are needed so that creative people get feedback immediately. Otherwise their great investment of energy and ego can make change quite painful. This decline inflexibility can occur in the few days it takes to summarize data from a more refined evaluation technique.

Six evaluation techniques were tested at the Pacific Science Center. Ranked on the basis of quick results and ease of application (table 1) they were: evaluation by a panel of judges, collecting comments in a suggestion box, observing what percentage of visitors paid close attention to a presentation, time-lapse photography, balloting by visitors, and having an observer unobtrusively follow sample visitors to determine how they were reacting.

Only evaluation by a panel of judges provided authoritative guidance during the early stages of a presentation's development. A checklist that focuses attention on objectives, the audience, and possibilities for improvement can help avoid inexpertness and preconceptions among available judges (fig. 3).

One additional phase of evaluation is to determine cost per visitor contact or perhaps some other unit of visitor participation. This requires records of both costs and attendance. A study of visitor contact facilities in the Black Hills National Forest showed a wide range of costs per contact. It also showed that nobody knew the cost per contact for various alternatives. Yet without this kind of information, cost effectiveness cannot be defined.

Evaluation of interpretive presentations probably will continue to be more art than science. A great amount of imprecise information can be obtained at little cost in time and money and with little burden on visitors. Given some understanding of the bias caused by visitors' desires to be congenial, the fact that people who visit interpretive programs and offer comments are self-selected, etc., managers of interpretive programs should be able to avoid the major pitfalls of using imprecise data. Many problems can be readily diagnosed from quite limited information. Nevertheless, managers must weigh the risks of using imprecise information against both the risks of nonevaluation and the costs of better data.

ACCEPTANCE AND APPLICATION

Acceptance and application of results from research on interpretation have been excellent. In fact, requests for publications, presentations, and consultation on interpretive matters have far outstripped the requests I have had for similar help based on research into recreational carrying capacity, recreation site management, estimation of visitor numbers, and visual management of forested landscapes. Our work to pull together interpretive principles and evaluation techniques has helped fill a void long recognized by interpreters. For several years research in interpretation was

Technique	Speed of feedback	Burden on personnel	Cost for equipment and materials	Guarantee against bias	Usefulness and limitations
Opinion from selected outsiders (panel of judges)	Excellent	Small	Low	Low	Identifies major problems before public presentation
Volunteered comments (via suggestion box)	Good	Small	Low	Low	Can identify range of reactions; respondents self-selected.
Observed audience attention	Good	Moderate	Low	Good	Requires training. Assumes that "attention" indicates effectiveness. Respondent characteristics may differ at different presentations, making comparisons risky.
Time-lapse photography	Good	Small	Moderate to high	Good	Records continually, identifies use patterns, and captures infrequent occurrences with little burden on personnel. Area covered from one camera position usually quite limited.
Voting at individual presentations	Fair	Moderate to great	Moderate	Moderate	Respondent characteristics may differ at different presentations, making comparisons risky.
Following selected visitors	Good to fair	Great	Low	Good	Best for studying visitor orientation and movements. Inefficient for rating visitor interest in specific presentations.

CHECKLIST

1. OBJECTIVES:
   a. From your observation of the interpretation, what do its objectives seem to be?
   b. Are they reasonable?
   c. (LATER) Are these the objectives outlined by the creators of the interpretation?
   d. If not, why the discrepancy?

2. AUDIENCE:
   a. In this setting, what are the likely objectives of the audience, and are the objectives of the interpretation compatible with the objectives of the audience or potential audience?
   b. What proportion of the potential audience is stopping?
   c. How long would it take the average visitor to fully experience this interpretation?
   d. How long are visitors actually spending with this interpretation?
   e. Do visitors seem interested or disinterested? Why?
   f. Which age groups seem interested and which disinterested?

3. SETTING AND DESIGN:
   a. Is it easy for visitors to reach or find this interpretation?
   b. Is the visitor given sufficient clues to experience different elements or units of the interpretation in a meaningful sequence?
   c. Is it easy and comfortable for the visitor to experience this interpretation? (Seating, if appropriate; suitable viewing available to children; etc.)

4. CONTENT AND DESIGN:
   a. Is any of the information incorrect? Unclear? Inappropriate?
   b. Do any conflicts occur within this interpretation or with nearby interpretation? (Consider competition for attention as well as conflicts in subject matter.)
   c. What opportunities for improvement are available?
   d. Why or how would these work better?

Figure 3.--Checklist for judging interpretation during its development.

carried out in close cooperation with personnel of the National Forest System and had their enthusiastic support. Also, in a survey of recreation managers and administrators in the South, 62 percent of the respondents rated "interpretation and understanding of forest and natural resource environments" as a top priority need (Task Force, 1974).

Many of our results from interpretive research have been used in training, not only by such agencies as the Forest Service and National Park Service but also in Africa and Latin America.

Like most other research, interpretive research is most likely to be applied if it is taken beyond mere proof that interesting relationships are probably significant (typically at .95 or higher probability). Although researchers still get most of their rewards for publishing such proofs, practitioners often need proven methodologies that have been worked out in some detail. Interpreters, however, have been unusually receptive to summaries of useful principles.

The primary barriers to conducting and applying research in interpretation are rooted in policies that reflect commodity-oriented land-use philosophies. (These policies are probably the major barrier for most forest recreation research.) Interpretation needs to be viewed as a vital part of resource management and, in the total mix of land use benefits, the enhanced experiences provided by interpretation need to be viewed as just as legitimate as traditional material products. This shift in philosophy and policy seems to be taking place, but agencies, like cultures, develop norms that remain stable for long periods and that can be changed only by overcoming great inertia.

The current bottleneck is in generating research results about interpretation, not in applying them. The Forest Service has been unable to continue its Environmental Interpretation Research Project. So far, although university researchers have contributed important studies, they have not mounted a sustained attack on interpretive problems. Such an effort might be stimulated by circulating the list of needed studies from a program analysis of Forest Service interpretation that is now in rough draft form in the Visitor Information Service (VIS) section of the Washington Office.

In conjunction with enlightened philosophies to guide land use policies, research in environmental interpretation can contribute greatly to the sustained flow of human benefits from our land resources.

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This is scheduled for publication early in 1976. With its emphasis on application it nicely complements Tilden.

Guideline. (A series of looseleaf sheets, part of "Park Practice Series")
See section entitled "Interpretation."

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Both of these periodicals are published by the Park Practice Program, Washington, D.C.

Journal of Environmental Education. Contains many articles applicable to interpretation.

See also the following items under Literature Cited: Boulanger and Smith; Dick, McKee, and Wagar; Dick, Myklestad, and Wagar; Machlis and Field; Mager; Putney and Wagar; and Washburne and Wagar.

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A CRITIQUE OF THE PAPER ENTITLED "ACHIEVING EFFECTIVENESS IN ENVIRONMENTAL INTERPRETATION" BY J. ALAN WAGAR

Ronald D. Johnson[1/]

Wagar's paper is an excellent one for land managers and interpreters. It presents very succinctly a rather typical overview of the scope of the interpretive function. Research reviewed provides managers and interpreters with guidelines and ideas to improve upon or to provide initial interpretive services.

One of the significant findings reported by Wagar related to the practice of selecting interpreters. Perhaps too often emphasis is on technical knowledge or training, experience and ability of the interpreter to communicate. This selection practice, the relative absence of career ladders reported, and findings which point out other discrepancies and deficiencies should not be viewed as generators of adverse reactions to the state-of-the-art of interpretation, nor cause criticism of personnel or services evaluated. Instead, it is proposed that research results, informal evaluations, and judgments disclosing weaknesses of this yet developing element of resource management - interpretation and interpretive recreation - be viewed in a manner which will allow an expanded perception of the state-of-the-art and provide a key to further developments.

In spite of the availability of several significant works, the body of knowledge related to interpretation appears to be relatively scanty. It is desirable that research results be published or broadly disseminated to practitioners in a manner which will popularize this important work.

The research itself must be broadened. In addition to identification of constraints, it is desirable that interpretive elements be discovered which will contribute significantly to the sustained flow of resource benefits.

We must tag on to developments in other disciplines as well, looking for the generic core which can be applied. Policy analysis can be "scientific." Admittedly, it is difficult for a control group and politicians to accept placebos if they have knowledge of expanded services to other constituents. Evaluative research can be employed; like other research, it can also be expensive.

On the other hand, we must shortly begin to identify and accept <u>principles of environmental interpretation</u> and resist funding replications of earlier "research", particularly in "environmental education". There is too much that is new to discover.

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Eventually, the electorate will make land use decisions, and already are, to an extent, through elected representatives and referenda. Our perspectives of scope of responsibility must be broadened. We have been dealing too much in ego-serving activities, "doing our own thing" in the out-of-doors, too often entertaining without much carry-over resulting, directing our energies to the one percent or three percent who "enjoy nature." Justification is needed to attract the attention of the masses; growing problems of land use may provide the vehicle.

One of Wagar's points is particularly significant. People want to have fun. Interpretive recreation, the appeal of the well-publicized special event, and other attention getters provide opportunities for the interpreter to "take" broader numbers, perhaps without their knowledge. Subliminal advertising, popularized by Huxley, needs to be modified by resource managers to give back to people a "sense of place" - "this land is my land." We are in the business of developing values, inculcating values, influencing value judgments, and interpreters like to discuss their role in this.

We are also in the recreation business, and this is where we have opportunities for "subliminal advertising." The ride in the 15-man war canoe is fun. Rafting over the rapids is fun. Can the leader convert the previously unconcerned, and send them home with a communication they can diffuse relating to the use and abuse of our waterways? The reward or payoff is there, as Wagar suggests. Hopefully, continued concern for the waterway will become the riverman's collateral.

In general, Wagar's paper treated research results related to the more formally-structured interpretive services. It would seem that the state-of-the-art includes the developing broader base of environmental interpretation.

Research is needed to evaluate the value of the experience to the participant.

What is the satisfying recreational experience? To whom?

What results are desired?

Will interpretation of the natural history yield more positive results when tied to the cultural heritage and practices?

Can we compare in long-term results the high-cost rafting trip with-the nature hike led by the classical naturalist? To what extent do we need both? Who defines the values?

Will the feeling of a "sense of place" from the personalized experience yield more than the ability to answer questions?

Can we as resource managers, find the time to search for the important questions before it is too late? Can we gather the information and develop the capacity to justify a higher priority on pay day; and what will be lost between now and then?

ECONOMICS APPLIED TO OUTDOOR RECREATION: AN EVALUATION

Frank J. Convery[1/]

Abstract.-- The uses and limitations of economics for outdoor recreation planners and managers are discussed. Special attention is devoted to the estimation of costs and benefits of providing outdoor recreation, and the extent to which such estimating procedures can be used by field personnel.

INTRODUCTION

The evaluation of outdoor recreation benefits is a much discussed, if stil poorly understood topic. I propose to examine this issue in the larger contex of the present and potential role of economics in outdoor recreation management and planning. The central concept of economics-choice-and what its acceptance implies, is first introduced. Then the derivation and use of cost and benefit estimates are successively discussed. Representative examples of pertinent research are cited, while the relevance and accessibility of such work to recreation planners and managers are concerns which pervade throughout.

ECONOMICS AS THE STUDY OF CHOICE

Economics is concerned with the study of choice. This implies that for economics to be useful as a management-planning tool, choice must indeed exist, both in fiscal-institutional-political terms, and in the mind of the manager. There seems to be a human propensity to unduly narrow the range of choices. As Henry Kissinger has observed:[2/]

> "I have seen it happen more often than not that when one asks for choices one is always given three: two absurd ones and the preferred one. And the experienced bureaucrat, which I am slowly becoming, can usually tell the preferred one because it is almost always the one that is typed in the middle."

If the manager is irreversibly convinced that present procedure is the best that can possibly be done, economic analysis in any meaningful sense becomes redundant. If applied in such circumstances the results if appropriate, will likely be used to support present or already planned activity; if the results do not support the proposed action, they will be ignored. The potential for change, then, must exist, for economics to be useful. The economist asks questions such as these: What are the alternatives? Is there a less expensive means of accomplishing this objective? Can we generate more benefits out of this level of expenditure? and so on. Although most of us would no doubt claim to welcome and encourage the analyses that the asking of such questions imply, in fact we observe that these issues are not routinely raised in recreation planning. A number of reasons may be posited in explanation:

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2/ Quoted in the New York Times Magazine, October 28, 1973.

1. Managers are so preoccupied with operational considerations that time is not available to critically examine what is being done, and to consider what might be done. Opportunity and capacity for reflection on alternative modes of operation are clearly prerequisites for the application of economic analysis.

2. Identification and analysis of alternatives can threaten vested interests. Since, by the very nature of their discipline, economists are trained to ask, is there a better way?, they implicitly threaten those whose interests are served by present procedures. If for example, it is concluded on the basis of a rigorous analysis that a campground should be closed down, or that an activity could be more efficiently carried out by another department or agency, it seems likely that those individuals who would be adversely affected by this conclusion will be displeased with the analysis. In order to avoid situations of this sort, and the uncivilized necessity of beheading the bringer of bad tidings, there is a tendency to try to prevent the issuance of the message in the first place. Economics can, in short be a very subversive science, posing some risk to those affected by its results.

3. Some skill is required to identify pertinent alternatives and to undertake the analysis; skill is also required to interpret its results. Managers who lack the requisite capabilities may prefer to forego analysis entirely, so as to avoid the potential embarrassment of having decision-making prerogatives somewhat pre-empted by a set of procedures which they do not understand.

To summarize this section, it is concluded that a major--perhaps the major--precondition for the fruitful use of economic analysis in outdoor recreation management and planning is an appropriate mental attitude by the potential user--an enthusiasm for exploring alternatives matched by a willingness to take risks, expressed in such terms as loss of position or authority if the results of the analysis call for same. The appropriate attitude and the undertaking of economic analysis are mutually reinforcing. By this I mean that the proper application of economics will encourage further probing of alternatives, until eventually such a mind-set becomes second nature to the planner. This reinforcement of the questioning instinct is an important benefit of using economics. While alternatives assayed will usually fall within the realm of what is presently feasible, options which involve contravening current legislative, budget, institutional or other constraints should be considered. If such is not done, the desirability or otherwise of modifying these constraints cannot be evaluated. Thus, at the extreme, a recreation planner might explore the implications of modifying the homocide laws so that miscreants caught vandalizing recreation facilities could be put up against a wall and shot right away (an option which has some appeal for the author). More realistically, a mix of strategies involving restoration of some police powers to the rangers, higher fines, public education, large rewards for information leading to convictions, etc. could be examined.

Given an appropriate perspective by the potential user, to what extent can the technical intricacies of economics be readily applied in outdoor recreation planning? The art of the economist can be used to delineate the costs and benefits associated with various alternatives. A special sub-classification would include local and regional income and employment impacts and distribution effects. Each of the two elements--costs and benefits --will be discussed with a view to elucidating the state of the art regarding their estimation vis-a-vis

outdoor recreation; the extent to which such information can be derived and appropriately interpreted by the recreation manager will be explored.

COSTS

Costs can be defined as the value of the good or service which is being given up (foregone) in order to undertake an action. The costs (and benefits) which are taken into consideration will depend on the perspective of the decision-maker involved. The private campground owner will count his cash outlays, together with an allowance for his own time and for depreciation of the facilities. State and local government campground administrators will include outlays from the government treasury in question; outlays which are financed by another level of government e.g. federal, state (in case of local govt.) will not be included as costs. Governments at this level will also be concerned with other costs; the disruptive effects of a recreation area on a local community, the damage to a fragile ecosystem, reduction of habitat for rare and endangered species comprise examples of this type of cost. The federal government is concerned with the welfare of the whole society, so that costs from this perspective will include all of what is being foregone by the various members of society in order to provide the recreation in question. Identification and measurement of costs at the Federal level represent the acme of complexity. Such costs can be placed in three categories:

(1) Direct input costs: Included here are costs of land, physical facilities, labor, etc. These should be valued at the welfare foregone by society in order to use the inputs for producing recreation opportunities. Since societal welfare cannot be measured, we substitute "value of output" foregone for welfare foregone; the cost of producing recreation is the value of the output foregone elsewhere in order to do so. In a full employment competitive economy, the price of the inputs at the margin represents their full social cost; if persons are hired at $100/week to supervise a campground, these individuals must be attracted away from other activities where their marginal products (contribution to output) are approximately equal to their respective wages. Likewise, under these conditions the price of other inputs will represent their full social cost. However, during periods of persistent unemployment some factors can be used in outdoor recreation activities without reducing output elsewhere in the economy; the price paid for such inputs will likely overstate the social cost of their use. Economists have developed algorithms for deriving the appropriate social costs--called shadow prices--of inputs (Haveman and Krutilla, 1968).

Even in a competitive, full employment economy, there may be conditions where price of all of the inputs does not identify all of the cost categories involved in producing outdoor recreation opportunities. Such conditions arise where external costs (externalities) exist. External costs are defined as costs which are external to, that is to say, not incurred exclusively by, the producer. They can be divided into two groups--environmental and social--and these comprise the remaining cost categories discussed in this paper.

(2) Environmental Costs: Environment is here used in the sense of the bio-physical environment. Costs of this nature include the elimination of species (Krutilla, 1967), the pollution of air and water, the despoilation of landscape, the termination in perpetuity of opportunities to enjoy an irreplacable and unique environment, and so on. These costs represent several

facets of foregone benefits--the downstream water user is deprived of clean water, future generations are deprived of the medicinal properties of the extinct plant, etc.

(3) Social Costs: These include adverse affects impinging on individuals and groups which are not included in (1) and (2) above. Such costs would include the damaging or destruction of a culture, such as the debilitation of the Indian cultures resultant from the Caucasian settlement of North America. Likewise damage or elimination of archaeological remains would be included in this group. Congestion costs--the costs recreation users impose on each other by their mutual presence in an area or facility are also costs of this type.

It has proved much easier to derive direct input costs in a common unit of value--dollars--than it has to quantify the environmental and social costs. These latter cost categories are commonly introduced as constraints--leave a buffer strip x feet wide to prevent stream sedimentation, preserve all archaeological mounds, and so on. The analyst can, however, assay the cost at which these constraints are maintained by successively relaxing them and observing the resulting change in net benefit.

The literature relating to the estimation of costs involved in the provision of outdoor recreation is surprisingly sparse. Beardsley, Schweitzer and Ljungre (1974) provide an interesting taxonomy of cost categories relating to the provision of wilderness recreation. Tyre (1975) presents average cost estimates for the provision of various outdoor recreation experiences on National Forests in the South. He uses the following formulation:

$$AC = [OM + C + O_1 + O_2 + OH]/RVD$$

Where:

AC	=	Average Cost
OM	=	Annual Operation and Maintenance
C	=	Construction (annualized)
O_1	=	Foregone opportunity to harvest present timber stocking (annualized)
O_2	=	Foregone opportunity to accumulate annual timber growth for harvest (annualized)
OH	=	Annual Overhead
RVD	=	Annual recreation visitor day (12 hours) use.

Lundgren (1974) provides a similar (hypothetical) example of the derivation of average cost of providing camping on a national forest in the Lake States. The Tyre-Lundgren estimates embrace only direct input costs. In addition to estimating average cost (Total Cost/Total Use), it is also helpful to derive marginal cost (incremental cost/incremental use). This tells the planner what the additional cost per unit of added use will be as a result of extending capacity, e.g. enlarging a campground, extending a trail, etc.

$$MC \text{ (Marginal Cost)} = \Delta \text{ Total Cost} / \Delta \text{ Anticipated Use}$$

As we have seen, average and marginal cost information is fairly straightforward to derive for direct inputs. Every recreation planner should know how

much various types of recreation use are presently costing per unit (average cost) within his or her jurisdiction and how much it would cost per unit to increase use (marginal cost) in these terms. Identifying environmental and social costs is much more complex. However, there will be instances where the choices are essentially invariant as to these types of cost, in which case direct input costs information assumes special significance. This will often be the case when environmental costs are represented in the form of constraints emanating from a higher administrative level.

BENEFITS

Just as a reduction in welfare (cost) cannot be adequately calibrated, likewise a welfare increase cannot be so measured. Once more, an increase in welfare is approximated by an increase in output of goods or services; such increases are valued by what individuals are willing to pay for them, which may or may not correspond to what is actually being paid. The symmetry between cost and benefit measurement should be noted: costs are measured by what we are willing to forego in order to appropriate the input(s) to the use(s) in question; benefits are measured by what we are willing to forego in order to appropriate the output(s) to the use(s) in question. Thus when two mutually exclusive uses are being compared for an area of land, the cost of using it in one use is the net benefit foregone by not using it in the other.

Most of the outdoor recreation economics literature is concerned with methods for valuing benefits. Knetsch and Davis (1966) identify the following recreation valuation methods:

(1) Gross Expenditures Method: Measures value to the user by the total amount spent on recreation. The concern in this paper is to help the recreation resource manager make better decisions. The entity of interest therefore is what individuals of the facility are willing to pay for admittance above and beyond what they incur for related items such as food, lodging, transportation and equipment, i.e. the value accruing to the resource is a residual value, just as a cinema owner is primarily concerned with what individuals are willing to pay for admittance, not what they spend on travel, food, etc. en route. Thus, while it is recognized that gross expenditures estimates will be of considerable interest and use to various segments of the recreation industry, they are not directly pertinent to the issue of managing an outdoor recreation resource.

(2) Market Value of Fish or Game: Imputes to hunting and fishing recreation the value of the game and fish caught. The hunter or fisherman should be willing to pay at least up to the expected value of the fish or game caught. For many sportsmen the expected value of the catch is but a minor portion of the utility deriving from this day's sport. Also, for many fish and game related recreation activities, such as nature photography and hiking, there is no fish or game harvest. Still, for certain types of hunting and fishing activity, this method does provide minimum value estimates.

(3) Market Value: Recreation benefits are valued by what people actually pay at the resource level for the experience. This of course is the primary measure of benefit used by private sector purveyors of outdoor recreation. The same tendency towards increase in complexity of the valuation process which

was observed in the discussion on cost estimation as one goes from the private sector through successively higher levels of government, also pertains to benefits. This results because of the existence of external benefits which presumably are a more prominent feature of recreation outputs on public lands. External benefits can be defined as benefits resulting from the provision of outdoor recreation which cannot be "captured" by the provider. Thus, if, as is sometimes claimed, camping makes individuals more contented, congenial and well adjusted and less apt to commit crime, the three dollar nightly camping fee charged will understate the social benefit of the experience. A limiting case of an external benefit is a public good, defined as a good, such as national defense or clean air, which, if made available to one person is automatically available to all.

Following the convention adopted in the case of costs, external benefits can be classified as environmental or social. Environmental benefits are the mirror image of the environmental costs discussed earlier: examples include the benefits of retaining habitat for plants and animals; the value to passersby of an aesthetically pleasing landscape; non-user benefits such as those accruing to individuals who derive satisfaction from simply knowing rare or remarkable areas or species exist, or to individuals who value the option of experiencing the environment in the future--option demanders. The retention of genetic information consequent on the preservation of species is another non-user public goods type of external benefit. Social benefits include reduction in crime and medical expenses, increased job productivity etc. resulting from the recreation experience(s). Favorable cultural, archaeological and other impacts would likewise be included in this category. Recreation benefits then can be classified as direct--those accruing entirely to the user, or external, sub-classified for expository purposes in this paper as environmental and social. In the instances where external benefits exist, the aggregate willingness to pay of users will understate total benefits generated. For a variety of political, institutional and cultural reasons, governments have generally not imposed a charge for outdoor recreation sufficient to cover costs of its provision. When there are no external benefits involved, this connotes a transfer payment from non users to users. If one particular group, e.g. the middle class are the principal users of a state's outdoor recreation facilities, the state government may feel that this group does not get its "fair share" of other state provided services, and this recreation subsidy is a means of compensation. At the Federal level, if congressional appropriations are related somehow to number of visitors, the U. S. Forest Service, U. S. Park Service, and Army Corps of Engineers may not wish to unilaterally raise fees, thereby reducing the number of visitors and their share of the Federal "pie." It may simply be prohibitively expensive to collect fees, or, if the additional cost associated with an additional visitor is very low, a decision could rationally be made to maximize social welfare by setting price equal to the (very low) marginal cost, even though this resulted in total revenues less than total costs. For these and other reasons too numerous to detail here, price of government provided outdoor recreation rarely renders an acceptable estimate of its direct user benefits, ignoring for the moment the external benefits which may also be generated. Economists have had some success in developing user willingness to pay estimates, the next category of benefit estimating procedures to be examined.

(4) Willingness to Pay Methods.[1] These methods purport to estimate the willingness to pay by consumers for outdoor recreation at the resource level, i.e. willingness to pay in excess of outlays for travel, lodging, etc. As such, if the estimates yielded were reasonably accurate, very worthwhile information would be provided to the recreation resource planner. Two valuation approaches have been developed:

(a) Interview Approach: In this method, each consumer is involved in a bidding game. Bids are systematically raised until the user declares himself excluded. This amount represents this individual's maximum "willingness to pay" for the experience. Summing these values for all consumers yields an aggregate maximum willingness to pay. The principal problem with this approach is the degree of reliability which can be attached to the information which the respondents provide. They may not be able to relate to the question(s) at all. Even if they can, if they think that the information will be used as the basis for charging for the recreation experience, there will be an incentive to understate; if on the other hand they feel that the information will help keep the area in its present use, the incentive will be in the opposite direction. A careful study by Robert K. Davis, valuing recreation use in the Maine woods, reported in Knetsch and Davis (1966) provides a good example of this approach. More recently the Environmental Research Group (1973) at Georgia State University undertook a very extensive household survey throughout the Southeast to elicit willingness to pay estimates for wildlife related recreation. However, difficulties of interpretation arose concerning these data as originally published; clarifications regarding what precisely was being measured, together with bridging material relating the method and results to the appropriate theoretical constructs in welfare economics are now in preparation.[2]

(b) Travel Cost Method: The basic idea underlying this H-C-K approach[3] is that increased access costs will tend to affect visitation in the same way as increased user charges. By observing the response to changes in the cost of access, we can impute the response to changes in the admission fee, and thereby derive the demand curve for the area in question. The area under the demand curve up to the quantity actually consumed yields the aggregate willingness to pay per unit time for the site(s). In addition to access costs, most applications of this algorithm include demand shifters such as income and influence of competing sites. It is implicit in this approach that the trip taken is a single purpose trip, and that travel time has neither positive nor negative value. These and other limitations, together with methods for overcoming them or mitigating their effects are discussed by Beardsley (1971). This author

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[1] These methods, and several other aspects of recreation economics are discussed very thoroughly by Kalter (1971), and Knetsch (1974).

[2] Personal verbal communication. Joseph C. Horvath, School of Forestry, U. of Montana.

[3] So called because the idea was first introduced by Hotelling (1949) and then developed by Clawson and Knetsch (1966).

feels that the travel cost approach should yield more reliable estimates than the interview method, because the former is based on actual rather than hypothetical behavior. Economists generally seem to feel that, if undertaken with skill and care and with assumptions clearly spelled out, the travel cost approach yields results which are imperfect but which are defensible as measures of user benefits from outdoor recreation. To what extent has this work been applied in the field?

A survey by the author of state recreation departments in the Southeast indicated that none of them attempt to place a value on the recreation experiences they provide. At the federal level some desultory use of the range of values recommended by the Water Resources Council (1973)[1/] is in evidence, but no sustained coordinated effort to derive "willingness to pay" values has been undertaken, to the author's knowledge. However, an excellent evaluation of reservoir recreation in Texas has been completed by Grubb and Goodwin (1971) for use in the Texas Water Plan, using an elaboration of the H-C-K method, and many other worthwhile ad hoc studies have been completed.

Another recent survey undertaken by the author indicates that the cost of implementing the willingness to pay valuation approaches ranges from $5,000 to $300,000 depending on the scope and complexity of the analysis. These are not large outlays when compared to the potential investment and quantity of output at issue. However, in addition to financial resources, a fairly high degree of technical skill is required to undertake such work and to interpret the results. Work of this nature is best undertaken at a regional level: data can be gathered most efficiently, avoiding costly duplication, a likely comcomitant of a project by project approach. Between-site interactions can be captured, and the requisite skills can be applied most efficiently. The field planner or manager will likely have difficulty deriving and using willingness to pay values if, in this respect, he is operating in an institutional vacuum. Instead of attempting to predict recreation use at a range of prices for a proposed plan or site--i.e. to derive the site demand curve--the planner can assume the present price range will obtain throughout the planning horizon. By getting a sense of the distance people are prepared to travel for recreation of the type in question, together with population and income projections for the localities defined by this travelling distance,[2/] and present rates of participation, some sense of potential consumption can be derived. This can be matched against present and potential capacity. If consumption will exceed capacity under these conditions, various rationing

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[1/] A value range of $0.75 - 2.25 per recreation day is recommended for general, ubiquitous recreation such as camping, warm water fishing and small game hunting. A range of $3.00 - 9.00 is recommended for specialized recreation, including wilderness camping and big game hunting.

[2/] Such small area projections are available from the Water Resources Council.

schemes such as raising price, instituting a first-come first-served permit system etc. can be examined; the possibility of expanding capacity can be explored, this being viewed in the context of what must be compromised elsewhere to achieve such expansion, and so on.

If the valuation of direct (user) recreation benefits is deficient in theory and practice, the equivalent process for external benefits has barely even begun. However, Krutilla and Fisher (1975) in their excellent book The Economics of Natural Environments point out that often it is not necessary to arrive even at direct benefit values for non-development use of natural areas. They identify, using time series data, an asymmetry in the valuation of the benefit stream resulting from development of natural resources as compared to the benefit stream resulting from leaving them in their natural state. They argue that the real price of the development alternative tends to fall over time as a result of technological development, while conversely the price of outputs from the non-development option is likely to rise since there are no close substitutes, supply is essentially fixed or declining, and such outputs appear to be quite income elastic. They demonstrate in a number of case studies that if the appropriate decay function is introduced in the development alternative, it has negative net benefits; the preservation alternative emerges by default as it were, as the best choice--the need for valuation of preservation benefits does not arise.

With some trepidation the following steps are recommended for the recreation manager regarding benefit estimation:

(a) Find out what is actually being paid presently in your locality for various recreation experiences comparable to those to be offered at the facility or area for which you are planning.

(b) Estimate the expected value of fish or game caught per visitor day.

(a) and (b) should give you a feeling for what the minimum values might be that you could apply to the proposed outputs. This last expression--proposed outputs--is a rather slippery concept, since the recreation actually consumed will depend in part on what is charged for it.

(c) Estimate future consumption along the lines discussed earlier in the text.

(d) If the choices are very contentious, as when an area suitable for wilderness designation also has valuable commodity resources, try to hire a competent applied welfare economist to help derive willingness to pay estimates.

(e) Encourage higher echelon personnel to devote resources to the development of willingness to pay estimates for recreation.

(f) Try to pinpoint and discuss external benefits emanating from the proposed recreation plan(s).

CONCLUDING REMARKS

It was suggested that a major advantage of using economic analysis in recreation planning is that it institutionalizes the consideration of alternatives. Prerequisites for fruitful use of economics include a positive attitude toward potential charge, sufficient time for and a capacity for reflection, and a capability to use and understand the analytic techniques. The manner in which economists set about identifying the costs and benefits associated with particular recreation plans was discussed. Two broad categories of cost and benefit--direct and external--were identified. It was concluded that in most instances direct costs (average and marginal) could be fairly readily derived by the recreation manager.[1/] Such information could be used to help guide pricing policy.[2/] Knowing the direct cost at which recreation of various types is being and can be generated can be very helpful to a decision-maker, even when the value of benefits generated in each instance has not been determined. Being able to examine the cost implications of implementing alternative means of reaching a predetermined objective can also be helpful. Among other things it may result in a re-appraisal as to whether that particular goal should indeed be "pre-determined." Except in the case of recreation provided by the private sector, and here by no means always, price paid does not usually yield a good measure of the direct (user) benefit of a recreation experience. A substantial research effort has been undertaken over the years to develop and refine methods for deriving such benefit values. The "willingness to pay" valuation approaches appear most appropriate, but their adoption by the major outdoor recreation providing agencies has been only sporadic. Until a more positive attitude on this matter is taken by the agencies, there is little the individual site planner can do in this regard, unless he or she happens to have skills in recreation economics and have the time to indulge them. Failing this, undertaking careful use projections under various scenarios, and displaying how much it will cost (direct) to accommodate various posited levels of consumption is a useful way to link use and resource requirements.

Efforts should be made to identify and discuss external costs and benefits. The implications of taking a significant irreversible decision (all decisions being irreversible in a trivial sense) should be spelled out with particular care. In some instances it will not be possible to classify an externality as either a cost or benefit, since its "value" will depend both on the perception of the individual and on the context in which it would occur. Thus the development of tourism in the Appalachians will be viewed by one person as a means of providing employment, thus retaining economic and thereby cultural viability in the mountains, while another will view the same proposal as emasculating and debilitating, likely to remove the last vestiges of individuality and dignity from the group in question. Economists have had some success at tracing the local income, employment and tax yield impacts of alternative levels of outdoor

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[1/] However, there may be difficulty in allocating some costs in the case of multi-output projects. However, reasonably satisfactory procedures have been developed for handling such situations. See Eckstein (1965) for a discussion of these.

[2/] Several articles in the Journal of Leisure Research 7(2), 1975 discuss recreation pricing policy.

recreation use. To a somewhat lesser degree, the distribution of benefits and costs--who gains and who loses, and to what extent--has also been examined.[1/] Such impacts can only be displayed, since their positive or negative significance will depend on perspective and context.

Thomas Carlyle admonished economists in 1850:

"Professors of the Dismal Science, I perceive that the length of your tether is now pretty well run; and that I must request you to talk a little lower in the future."

This refrain is frequently echoed today. I hope that this paper gives some small flavor of the more positive aspects of the Dismal Science as it relates to outdoor recreation.

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A CRITIQUE OF THE PAPER ENTITLED "ECONOMICS APPLIED TO OUTDOOR RECREATION: AN EVALUATION"

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There are two major questions posed in the "Introduction" to this paper, i.e., (1) what are the present and potential roles of economics in outdoor recreation management and planning, and (2) what economic research is relevant and/or accessible to recreation managers and planners?

The major portion of the paper is a response to the first question consisting of a discussion of the concepts and methodologies of recreation benefits and costs, and the arguments on their strengths, weaknesses, and applicability are well presented. The second question, however, begs to be answered.

After bemoaning the fact that unless the manager maintains an open mind concerning alternatives, economic analysis becomes redundant; Convery reveals the root of the problem in listing questions "The economist asks. . .: What are the alternatives? Is there a less expensive means of accomplishing this objective? Can we generate more benefits out of this level of expenditure? and so on." In terms of generating economic analysis which is both useful to and usable by managers, the questions which are perceived as relevant to managers are not those the economist asks, rather those the manager asks. Recreation planners and managers are typically concerned with such questions as "How many picnic tables should be built?", "What mix of facilities should be constructed on a given site?", and "What will be the effect of the fuel crisis on recreation visitation?" Granted the possibility that some of the questions asked by both could and/or should be the same, I would agree that often this is not the case for some of the same reasons listed by Convery. In addition, I would argue that many recreation managers' experiences with economists and economic analysis have been limited to presentations by economists on a theoretical/conceptual level rather than an immediate problem solving level and that when the concepts have in fact been applied to on the ground problems, the results and implications of the work have not been effectively communicated to the manager, ergo the Dismal Science.

This is not to suggest that the lack of communication is a one-way affair. LaPage (1974) has suggested that the word "'demand' sums up a world of misunderstanding" between economists and recreation administrators. He explains thus:

> For the economist, "demand" is a concept of simple elegance and almost unlimited utility. For the recreation manager, "demand" is that less than elegant, but equally unlimited, horde knocking down the gate.

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It is further suggested that "market analysis" provides a middle ground "where economic theory and the realities of administration can meet and where both economists and managers can find useful answers to their questions." LaPage goes on to say the questions usually heard from park managers "are not questions of 'how much recreation at what price?,' they are questions of 'what kinds of recreation and for how long?'"

Recreation researchers in general and economists in particular must take the initiative in establishing effective communications with recreation managers and planners to determine what problems are perceived as relevant so that research and analysis can be oriented to those areas. Only through such efforts will managers and planners gain an appreciation for the potential power and relevance of the discipline as it relates to outdoor recreation.

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PRINCIPLES OF RECREATIONAL CARRYING CAPACITY

David W. Lime[1/]

Abstract.--Recreational carrying capacity is a complex and troublesome concept that incorporates principles of the social as well as the physical and biological sciences. There is no magic number that is the capacity for a given recreation site. Deciding how much and what kind of use is acceptable for an area must be based on managerial judgement and experience. The uncertainty of such decisions can be substantially reduced by a consideration of the interrelationships of (1) management objectives, (2) recreation user attitudes, and (3) impacts of recreation use on natural resources. Some basic principles, based on a review of the current state-of-the-knowledge, that relate to carrying capacity and that seem relevant to outdoor recreation management are discussed.

Additional keywords: Management objectives, user attitudes, resource impacts, managerial judgement, regional planning, and use control techniques.

Recreation planners and administrators are increasingly being challenged to manage the growing numbers of outdoor recreationists. Many areas, both public and private, are being threatened by overuse. For some managers the situation is reaching crisis proportions--the physical environment is being damaged beyond acceptable limits and the people visiting these areas are no longer receiving a quality or enjoyable outdoor experience.

Determining Recreational Carrying Capacity is frequently voiced as a manager's answer for solving the problem of seemingly overused recreation areas. In defining carrying capacity, I assume that the primary goal of recreation management is to provide enjoyment and benefits for people. There are certain constraints in doing this, of course--budgetary, administrative, legal, and the capabilities of the physical environment. Thus, managers must determine the amount and character of use an area can sustain over a specified time period without causing unacceptable change to the physical environment or to the experience of the user.

Deciding what constitutes unacceptable change is fundamental to the capacity concept. Numerous students of the capacity issue have identified the interrelationships of (1) management objectives, (2) visitor attitudes and perceptions, and (3) impacts of recreation use on the resource (e.g., Wagar 1964, Lime and Stankey 1971). All three are important in determining capacity, but one component may be more significant than another depending on the type of recreational activity and area being considered.

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Carrying capacity then, is a management concept, a framework or way of thinking about how to plan and manage a particular recreation resource. It is not the basis for some magic formula that gives the manager the answer to the continuing question, "How much use is too much?"

Carrying capacity is a complex and troublesome concept that incorporates principles of the social as well as of the physical and biological sciences. It frustrates those attempting to conceptualize and apply it. There are numerous calls for more capacity research (Bureau of Outdoor Recreation 1975, Idaho Water Resources Research Institute et al. 1975). Moreover, public land managing agencies have received a mandate, through the Nationwide Outdoor Recreation Plan (Bureau of Outdoor Recreation 1973), to determine specific carrying capacities for their areas and to manage them accordingly. This commitment requires that:

> "Each Federal recreation land managing agency will determine the carrying capacity of its recreation lands, considering management objectives, ecological concerns, and user characteristics."
>
> "As a second step, each Federal recreation land managing agency will institute necessary controls and develop new ways of managing the movement of people to ensure that use does not exceed capacity."

Carrying capacity of recreation lands has been discussed in the literature since the 1930's, but attention intensified markedly in the 1960's and has continued into the 70's. Several recent attempts have been made to bring together and review literature relevant to the carrying capacity issue (Chubb and Ashton 1969, Ditton 1969). In 1971, Lime and Stankey published a state-of-the-knowledge paper. In 1973, we published an annotated bibliography with over 200 citations (Stankey and Lime 1973). Since that time, several other important papers have appeared that add depth to the carrying capacity concept and synthesize the growing body of literature on this subject (Conservation Foundation 1972a and 1972b, Lloyd and Fischer 1972, Fisher and Krutilla 1972, Frissell and Stankey 1972, Burden and Randerson 1972, Tivy 1972, Ashton and Chubb 1972, Hopkins et al. 1973, Alldredge 1973, Sudia and Simpson 1973, Lucas and Stankey 1974, Lime 1974, Ohmann 1974, Stankey 1974, Hammon et al. 1974a and 1974b, Wagar 1974, Ditton 1974, Conservation Foundation 1974, Verburg 1975, Pfister and Frenkel 1975).

In spite of the growing body of capacity literature, I contend that the basic conceptual framework for carrying capacity has changed little since the first definitive writing on the subject in the late 1950's and early 60's (Anderson 1959, LaPage 1963, Wagar 1964, Lucas 1964a). These and most of the others noted stress that carrying capacity considerations must recognize both the durability of the environment to sustain use and the ability of the site to produce a continuing flow of satisfactions and benefits to users.

Those interested in the philosophical and conceptual aspects of capacity, on biological and social research, and on techniques for managing for carrying capacity are urged to read these references. Verburg's paper(1975), especially, is the most recent review and an excellent synthesis of the previous work.

I will not review or summarize these previous papers. I will attempt, however, to briefly identify six basic principles that relate to carrying capacity and that seem relevant to outdoor recreation management in the South and elswhere.

Carrying capacity can be defined only in light of management objectives for the area in question.

Although the character of the resource can indicate the durability of a site under sustained use, almost any site could be "hardened" to accommodate the type of recreational opportunity called for by management. Management objectives should define, as specifically as possible, the kind of recreational opportunity or opportunities that the area is to provide.

Perhaps two types of management objectives can be differentiated: (1) broad objectives influenced or controlled by enabling legislation and general administrative policy; and (2) move explicit objectives that delineate the desired environmental setting to be sustained and user experience(s) the area is to produce.

Broad, general objectives typically: (1) could identify the kind(s) of activities that might be provided (e.g., camping, picnicking, fishing, sightseeing, and hunting); (2) whether consideration would be given to the protection of natural features; and (3) whether the area should be developed to serve as many people as possible or should be limited to one or more specific kinds of users, such as campers or hikers.

Explicit objectives typically are more difficult to define because they must identify what kind of experiences are to be provided, and how and where these experiences will be managed and sustained. The manager must be concerned with such issues as the following:

1. General use intensity or level of solitude desired,
2. Type(s) of use desired--automobiles, off-road recreation vehicles (ORRV's), horses, overnight and/or day-use, large groups,
3. Level of development and accessibility of recreation facilities desired--from simple to elaborate and remote to easily accessible that denote a range in the character, number, and location of facilities, and,
4. General degree of naturalness desired (on a continuum in which wear and tear to the resource is limited so it will recover naturally over time to an opposite situation in which the site is intensively managed and "hardened" in order to accommodate intensive use).

These more explicit objectives may also be influenced by administrative and policy constraints. Furthermore, limited funds, personnel availability, and technical limitations can inhibit certain objectives. Studies of user attitudes and preferences and research to determine environmental impacts of use also can help establish objectives.

Obtaining attitudes and preferences of recreation users and non-users can help administrators set objectives and may suggest needed changes in current policy.

Management cannot rely solely on public opinion as a basis for policy. Yet, there usually is more than one alternative for a given management problem. Scientifically collected information provides a more accurate cross section of views than do public meetings or occasional letters and personal visits from highly motivated citizens. Such information provides inputs from publics not otherwise available.

Soliciting public opinion, however, does allow the manager to review the mix of attitudes that exists regarding a specific issue. Frequently, users and potential users disagree as to what they want--a quality experience to one person may be altogether unacceptable to someone else. Furthermore, and perhaps more importantly, user preferences may be quite different from manager preferences and from what managers believe the public wants (Stone and Taves 1958, Lucas 1964b, and 1970, Hendee and Harris 1970, Clark et al. 1971, Peterson 1974).

Gathering data on public attitudes can be especially useful in identifying the range and mix of public desires for a given recreation site or geographic region. Such information can help managers define specific conditions or actions necessary to achieve management objectives. For example, an agency might decide to provide basic camping facilities (accessible by automobile) in relatively remote locations. Studies of attitudes could provide indices of how visitors might respond to different-size campgrounds; the type of setting individual camp units are located in; spacing between units; the kind and spacing of toilets, water facilities, and other facilities (trails, playground equipment, etc.); the design of access roads; and, various information and interpretation materials.

Public attitudes can be categorized in an infinite number of ways. Groups might be differentiated by their: (1) perception of a site as a local, State, regional, or national resource; (2) motives for visiting the area; (3) previous outdoor recreation experiences; and (4) knowledge of alternative activities and areas. Wilderness users, for instance, have been categorized on the basis of how "wilderness oriented" their attitudes were (Hendee and Stankey 1973). Other research has identified differing attitudes for distinct use-seasons (Shafer 1969) and for different locations within a given recreation area (Beardsley 1967, Lucas 1964a, Lime 1971).

The results of such attitude surveys are not a substitute for management experience and good judgement. Nor do such studies make decisions easier for managers. On the contrary, results may increase the number of alternatives that must be considered. It also is important to know who may oppose various management actions. Once management decisions are made, especially on controversial issues, it may be as important to take appropriate steps to explain to these users why their preferences cannot be met as it was to learn about the mix of opinions in the first place (Lime 1972).

A full range of recreation opportunities within a region to satisfy the diversity of recreation tastes is desirable.

In setting management objectives and standards for an area such as Southern Appalachia, it seems imperative that managers think of developing a balanced system or spectrum of recreation opportunities. These should include not only a variety of regional recreation activities (hiking, swimming, hunting, boating, etc.) but also a range of different kinds of opportunities for a given activity such as auto-access camping (Lime 1974). No one manager or agency need feel obligated to meet the demands of all recreation users. Each public agency, for example, could aim at providing one or more specific types of recreation opportunities and refer those wanting something different to a more appropriate area.

Obviously, regionwide collaboration among private and public managers is mandatory if a full and appropriate mix of opportunities is to be provided. There does seem to be some dialogue among those managing developed campgrounds (Angus et al. 1971, Lime 1974). I have reviewed some long- and short-term management plans, which indicates that between them it is possible to provide the public with a full range of campgrounds from the most simple to the most elaborate. Some federal and State agencies now indicate they plan to take a major role in providing low-density, simple campground development and are encouraging the private sector to take the lead in providing intensively developed facilities. Although my review indicates that regionwide planning is possible, more coordination seems both desirable and necessary--for all types of outdoor recreation.

The character and amount of change permitted to occur to the resource resulting from recreation use must relate directly to management objectives.

The durability of an area's resources to withstand use is an important constraint on carrying capacity. But, knowing what changes occur under specific levels and kinds of use does not by itself tell the manager what is an acceptable amount of change. To define what change shall be permitted, the manager should relate resource change to specified management objectives.

There are many possible "standards of acceptable change" the manager could use. For example, in an elaborate, high-density-use camping area, the management objectives would allow the manager to employ a variety of techniques to offset resource impacts--such as paving, barriers, and planting hardy species. On the other hand, in a campground with a similar resource base but where the objective is to provide camping in a fairly natural setting, the amount of resource change permitted would be comparatively small. In this case the manager would probably rely on use restrictions rather than on techniques that would "harden" the site.

There are many techniques to manage an area for its carrying capacity; the techniques selected, however, should depend on the management objectives for the area.

A decade ago Alan Wagar (1964) developed a useful framework for discussing various ways to manage both natural resources and visitors for carrying capacity. He emphasized that the selection of a technique or combination of techniques to control the character and amount of use largely depends on the specific management objectives for the area. In doing this, managers should seek to: (1) reduce conflicts among competitive uses, (2) reduce the destructiveness of some users, (3) increase the durability of the physical resource, and (4) provide increased opportunities for visitor enjoyment. These goals can be achieved by the three overlapping types of control measures summarized in table 1 (Modified from Lime and Stankey 1971, Gilbert et al. 1972).

Table 1.--Some measures to control the character and intensity of recreational use to meet desired management objectives

Type of control	Method	Specific control techniques
Site Management (Emphasis on site design, landscaping, and engineering)	Harden site	Install durable surfaces (native, nonnative, synthetic) Irrigate Fertilize Revegetate Convert to more hardy species Thin ground cover and overstory
	Channel use	Erect barriers (rocks, logs, posts, fences, guardrails) Construct paths, roads, trails, walkways, bridges, etc. Landscape (vegetation patterns)
	Develop facilities	Provide access to underused and/or unused areas Provide sanitation facilities Provide overnight accommodations Provide concessionaire facilities Provide activity-oriented facilities (camping, picnicking, boating, docks, and other platforms, playground equipment, etc.) Provide interpretive facilities
Direct Regulation of Use (Emphasis on regulation of behavior; individual choice restricted; high degree of control)	Increase policy enforcement	Impose fines Increase surveillance of area
	Zone use	Zone incompatible uses spatially (Hiker only zones, prohibit motor use, etc.) Limit camping in some campsites to one night, or some other limit

Table 1. (continued)

	Restrict use intensity	Rotate use (open or close roads, access points, trails, campsites, etc.) Require reservations Assign campsites and/or travel routes to each camper group in backcountry Limit usage via access point Limit size of groups, number of horses, vehicles, etc. Limit camping to designated campsites only Limit length of stay in area (max./ min.)
	Restrict activities	Restrict building campfires Restrict fishing or hunting
Indirect Regulation of Use (Emphasis on influencing or modifying behavior; individual retains freedom to choose; control less complete, more variation in use possible)	Alter physical facilities	Improve (or not) access roads, trails Improve (or not) campsites and other concentrated use areas Improve (or not) fish or wildlife populations (stock, allow to die out, etc.)
	Inform users	Advertise specific attributes of the area Identify the range of recreation opportunities in surrounding area Educate users to basic concepts of ecology Advertise underused areas and general patterns of use
	Set eligibility requirements	Charge constant entrance fee Charge differential fees by trail, zone, season, etc. Require proof of ecological knowledge and recreational activity skills

Managers can employ many techniques in and around a recreation site to protect soil, vegetation, wildlife, and water. Such measures channel or restrict the movements of people thereby limiting the area they damage, provide surfaces that can withstand intensive use, and provide access and facilities to areas that are otherwise unused or very lightly used.

It is important to recognize that site management techniques have an immediate and significant affect on the character of the area and the kind of recreational opportunity offered. Hence, drastic or even seemingly subtle changes in the design and types of facilities used can alter the character of the site to the point that it may no longer be satisfactory to the current users. This transition has often been observed in small, informal campgrounds that have been closed or have evolved into large, modern, intensively-developed camping areas. The resulting process of "creeping campground development" forces out a sizable segment of those campers seeking solitude and contact with nature (Hendee and Campbell 1969, Clark et al. 1971, Lime 1974). In many areas these "displaced campers" can no longer find the type of camping areas they enjoy.

There also are many direct and indirect ways to control recreational use. By direct, I mean controls that directly regulate where and when visitors can use the area, how long they can stay, and what sorts of activities they can engage in. Some of these measures are very authoritarian and greatly restrict the user's freedom of choice.

Indirect controls, on the other hand, are more subtle and less obtrusive. They do not interfere directly with an individual's freedom of choice. The emphasis is on influencing the user to make choices that produce changes desired by the manager. In essence, the manager seeks to modify user behavior without the user being aware of this influence. For instance, reducing trail maintenance in certain areas might convince some hikers not to use those trails in favor of others that are better maintained. As another example, hikers seeking solitude could be informed specifically where use is lightest. In both examples, such actions could help redistribute use and might also help more people increase their enjoyment.

As a general strategy, I would urge that the indirect, more subtle types of controls be tried and evaluated first before the more authoritarian, heavy-handed kinds of actions are pressed into service. In particular, do not apply heavy-handed use restrictions because they appear cheapest or administratively convenient. When more regulatory types of measures are necessary, they should be applied as far in advance of the visitor's arrival at the site as possible (Lucas 1973, Magill 1974, Stankey et al. 1974). In established wilderness areas and in unroaded backcountry settings, controls should be applied before the visitor enters an area; and, the visitor should be free to roam within the area.

Ultimately, the recreation manager is still left with the difficult decision of deciding how much and what kinds of use are acceptable for a given area, and how and where such uses are to be managed and sustained.

For some decisions, the appropriate course of action is rather clear because there are few alternatives. In others, information necessary to make the decision may be meager or conflicting. Further, decisions may be influenced by administrative, legal, budgetary, and resource constraints.

Research can help a manager by finding out what people want from a recreation experience and what they think about alternative actions. It can also help by determining how the resource will be affected by various kinds and levels of use. In effect, however, such information only reduces the range of uncertainty associated with a given decision; it does not eliminate the uncertainty.

The point is that research, both social and biological, cannot be viewed as a panacea for management that will tell the recreation manager what to do. As I stressed earlier, there is no magic formula for capacity and there is no magic number that is the capacity for an area.

Without a marriage of managerial judgment and facts, the quest for quality recreation management appears destined for "rougher days ahead". Some warn that without adequate public participation in resource decision making "...resource managers will find themselves in the backwash of the environmental movement, serving as mere resource custodians with most decision making in other hands" (Hansen 1970).

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A CRITIQUE OF THE PAPER ENTITLED "SOME PRINCIPLES OF RECREATIONAL CARRYING CAPACITY"

Leo F. Marnell[1/]

The concept of recreational carrying capacity has gained wide acceptance during the past decade among practitioners of outdoor recreation management. But the transformation of theory into on-site planning and management is an awesome task, one that appears to be progressing with some difficulty. Perhaps recreation management as a profession is on the threshold of an era where necessity will dictate the required solutions.

The author is cautious in his treatment of the subject. This, however, is understandable in view of the turmoil which accompanied the early evolution of the concept. Acceptance of recreational carrying capacity as a workable approach was initially set back by misguided enthusiam. Many proponents failed to comprehend the difficulty of interfacing a conceptual model with the realities of applied management. The procedure advocated by Dr. Lime provides planners with a notion of the appropriate end product, but it remains ultimately the manager's task to find the most acceptable way to accomplish this. The author's approach to carrying capacity determination does not promise a clear path to easy solutions. As noted in the paper, decisions should be made better, but they will not necessarily be made easier. Perhaps, the greatest value of the concept is that it provides a framework for identifying the most important considerations in management decision-making.

Recreational carrying capacity is a multi-dimensional concept. The goal of management is to maintain the quality of the resource and sustain user enjoyment at some predetermined level. The word "predetermined" is significant and forms the basis for a lengthy discussion of management objectives. A "hierarchy of objectives" is examined by the author with consideration directed first to the role of enabling legislation, broad general policies, etc. Although these mandates identify some of the basic constraints, the manager eventually arrives at that level of decision-making which requires a choice between alternatives, and often there are many. Several approaches are suggested as aids (i.e., research, public opinion surveys, etc.), but it is also recognized that a manager will often be required to make judgments not totally acceptable to his clientele. One caveat not mentioned, though it is implied under the term "administrative constraints", is the matter of political influences on management decision-making. This is not a point worth belaboring, but the record shows that it is a factor which public land managers must reckon with. Not even the most scientifically based approach to carrying capacity determination will survive intact if circumstances bring adverse political pressures to bear.

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Some penetrating questions are posed by the author's suggestion that recreation planners (federal, state, private, etc.) in a given geographic region collaborate to provide a "balance system or spectrum of recreational opportunities." Few would challenge the desirability of such an effort, but the prospects for success are questionable. Of paramount importance, at least in the case of public recreation resources, is the necessity of instilling this kind of thinking in our legislators. A balanced complement of recreation resources within a region will require vision and careful planning at this level. Interagency cooperation in such a venture is not an insurmountable barrier as long as goals and objectives remain within the scope of the various agencies' governing policies. Perhaps to stimulate the involvemnnt of state agencies and private enterprise in such a venture, the federal government should consider grants or other subsidies contigent upon cooperating parties filling certain voids in the "spectrum". The benefits of what could be gained through this approach might make the effort worth pursuing.

Included in the paper is a table describing strategies for regulating use within established limits. Although not detailed, the list outlines adequately the basic alternatives for manipulating both people and resources to achieve prescribed objectives.

Not a great deal has been done in the way of on-site implementation of current theories in recreational carrying capacity, but several efforts have gone forth with modest success. With the current interest in recreation research, positive results may soon be realized on a broader scale. The central theme of the paper might have been strengthened by the inclusion of a few "case histories" describing the results of pioneer efforts in establishing carrying capacity. Overall, the author has done an admirable job of probing the complexities of a provocative and widely talked about subject.

HUNTERS AND HUNTING: MANAGEMENT IMPLICATIONS OF RESEARCH

John C. Hendee and Dale R. Potter[1/]

Abstract.--Data are summarized from 33 studies pertaining to hunting participation--hunter characteristics including age, education, occupation, income, residence; hunter motives; membership in sportsmen organizations and reading of sporting magazines; antihunting sentiment; and nonconsumptive wildlife use. These data are interpreted for implication about the future importance and nature of hunting and wildlife management. The authors see the continued importance of hunting but perhaps at reduced levels. The provision for and integration of opportunities for both hunting and wildlife appreciation are an important resource management challenge.

Keywords: Hunting, hunter characteristics, hunter motives, antihunting, nonconsumptive wildlife use, wildlife management.

INTRODUCTION

Hunting has been a popular American activity ever since nomadic groups crossed the Bering Straits in pursuit of game. These first native Americans depended on their hunting success for survival. But even then, hunting was more than a source of food. The legends and folklore of early American cultures abound with references to the festivity, glory, and satisfactions of the hunt. Even then hunting was pleasurable as well as necessary.

Likewise, the folklore describing white colonization of the American frontier is replete with reference to hunting as a recreational activity, a source of food for the spirit as well as the body.

Today, the pleasures associated with hunting still have an important place among our cultural traditions, although 20th century development has severely reduced game habitat and free opportunities to hunt. As industrialized society grew in the United States, millions of acres of game habitat were wiped out by urban sprawl, population growth, commercial development, the advent of agri-business, reclamation of marshland and desert, and clean cropping of arable land. The loss of rural American lifestyle has also been important in its impact on the prevalence of hunting. Today, most Americans

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are second or third generation urbanites who have not spent their youth close to the "split rail" values described by Leopold (1949). They are removed from the influence of rural traditions and values which foster hunting as a recreational outlet and a supplemental source of food.

Fortunately for hunters and game alike, the urbanization and industrialization of America were accompanied by the development of several natural resource management professions--forestry, wildlife and range management--and by many State, federal, and private wildlife organizations. These professions and organizations are devoted to applying modern concepts and management techniques to make our scarce natural resources go farther in meeting increasing and competing demands. Some game species such as deer, elk, and turkey have increased in response to management.

Within the modern resource management context, hunting is incorporated in a larger land use planning equation. In this planning process, the many demands for use of natural resources are evaluated by managers with the help of the public. Many managers and hunters are concerned about the weight given to hunting in the overall planning process. Some think that interest and participation in hunting is decreasing in the United States in favor of nonconsumptive uses of wildlife. Conflict is already evident between hunters and segments of the public opposed to hunting on grounds that it is a barbaric and intolerable activity in modern society. For their part, hunters quote managers' claims that some game can be harvested each year to maintain healthy populations. They also point to the crowded ranks of nimrods as evidence of the popularity of their sport.

Guiding the future development of hunting and game management will not be easy. This planning must take advantage of the latest research-based information. In this paper, we summarize data from more than 33 studies of hunters and discuss their implications for important game management issues and concerns.[2/] In particular, we will try to use these data to forecast future participation in hunting as a consideration in resource management and to lay a groundwork for the management challenges to come.

HOW POPULAR IS HUNTING?

The many competing demands for land use challenge managers to evaluate the impacts of all potential uses. One measure of a recreation activity's impact and popularity is the number of persons that participate.

Nationally, hunting is a popular sport. About 16.4 million persons hunted in 1974 or nearly 8 percent of the U.S. population over 12 years old. Since 95 percent of hunters are males, this means that almost 15 percent of U.S. men are hunters. For comparative purposes, consider that only 4 percent of the U.S. population snow ski, 9 percent hike, and 14 percent camp (U.S. Bureau of Outdoor Recreation 1971).

[2/] See appendix 1 for a list of studies summarized in this paper and background information on them. Other reviews of studies appear in Peterson (1969) and Schole (1973). Additional literature on related human behavior aspects of wildlife are annotated in Potter et al. (1973a) and the state of knowledge and need for specific research assessed in Hendee and Potter (1971).

Trends in hunting participation are complex. The 16.4 million licensed hunters in 1974 (U.S. Department of the Interior 1975) reflect a 16-percent increase in number since 1961 (fig. 1A).

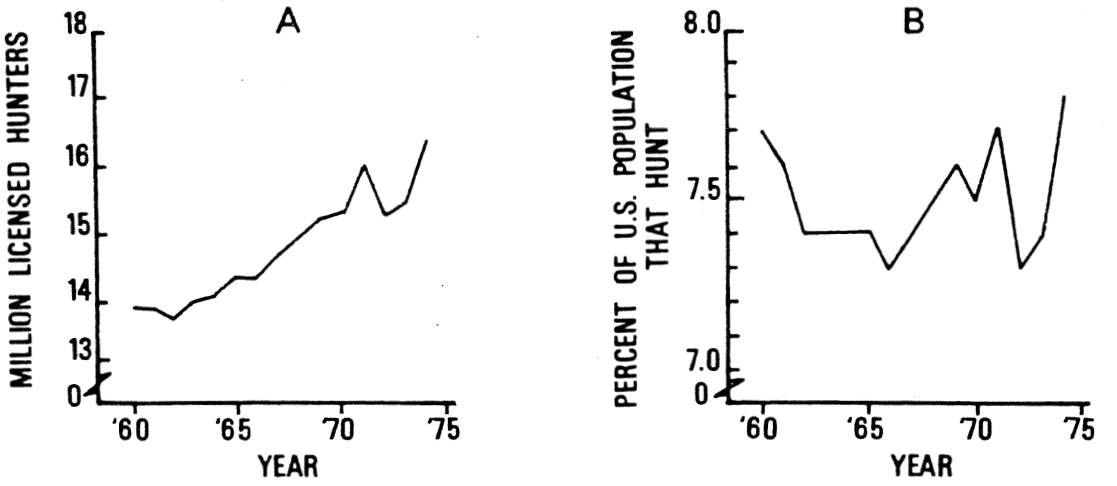

Figure 1.--Trends in the number of licensed hunters in the United States and percent of licensed hunters in the population. (Only licensed hunters are shown; a 1960 national survey showed that one hunter in five is unlicensed (U.S. Department of the Interior 1961).) Source: Compiled from U.S. Department of the Interior Fish and Wildlife Service records.

This trend suggests continued growth in the absolute numbers of hunters, but it does not show whether hunting is holding its own in relation to general population growth. Figure 1B shows licensed hunters as a percentage of U.S. population and indicates that the proportion of hunters in the population fluctuates from year to year. But the overall trend is neither up nor down and has remained between 7 and 8 percent for the last 15 years. In other words, these two graphs show that, nationally, the absolute number of hunters continues to increase, but hunting participation has held its own during the last 15 years in the proportion of the American public that hunts.[3/]

Figure 2 shows that there is considerable regional variation in hunting participation among the nine U.S. census regions as reflected by number of licensed hunters and percent of the population that hunted in 1970 in each region. Participation ranged from a high of almost 17 percent in the Mountain States, to a low of 5 percent in New England, Middle Atlantic, and Pacific regions. This regional variation appears to be related to a number of factors such as population density, urbanization, land ownership, hunting opportunity, game populations, and regional subcultures.

Clearly, hunters are a minority group but so are other prominent outdoor recreation groups--such as skiers, hikers, and campers. Urban sprawl and

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[3/] For an excellent discussion of trends in hunting license totals dating back to 1937, see Poole (1964).

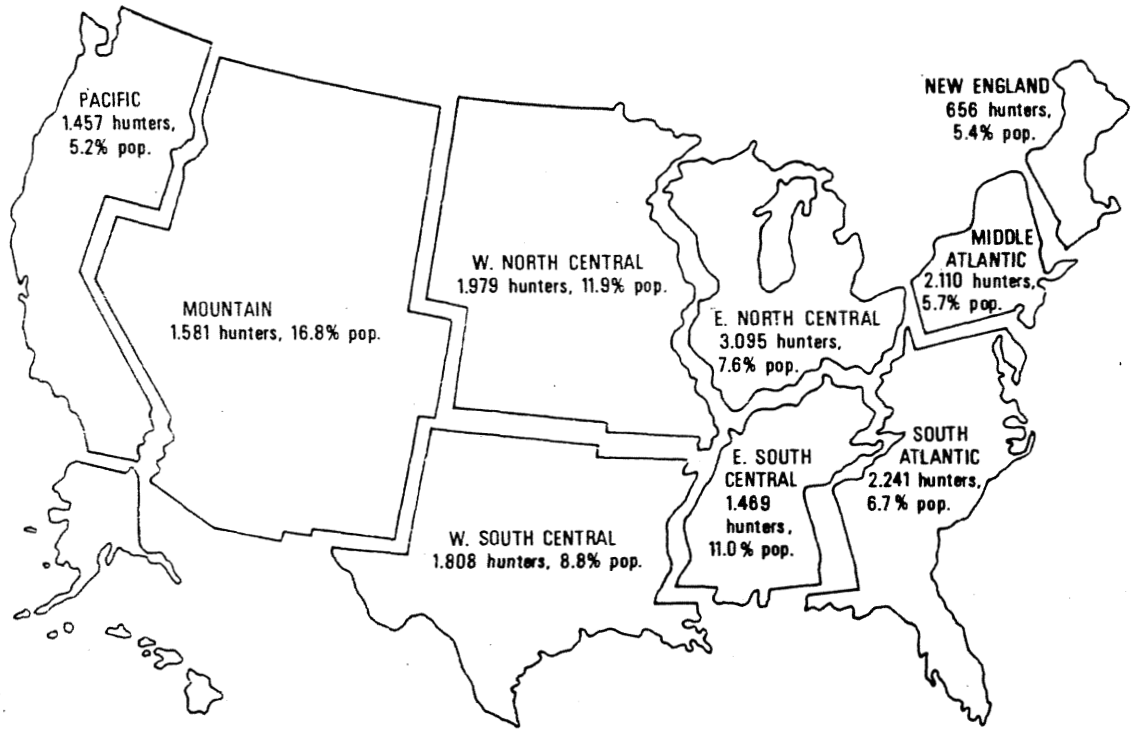

Figure 2.--Number of hunters (millions) and percent of population that hunted during 1970 by regions. Source: U.S. Department of the Interior 1972.

development continue to reduce game habitat and hunting opportunities. But the demand for hunting seems likely to continue.

What do these trends mean to wildlife managers? First, the increasing numbers of hunters will cause additional hunter crowding and make it more difficult for managers to provide quality experiences. This is particularly true considering that the amount of land available to support game and hunting is declining, with few exceptions. Second, the relatively constant proportion of the population that hunts shows no signs of predicted downturn in hunting participation. The Southeast River Basins Commission presents figures showing that the per capita demand for hunting was not expected to be sustained beyond 1975; and by the year 2000, the percent of user days of hunting will decline (U.S. Study Commission, Southeast River Basins 1963). Another assessment indicates that by 1985 the proportion of the population that hunts will not only decline but the absolute numbers likewise will be reduced (Cicchetti 1969).

Such predictions are viewed with much alarm in some quarters, even though not yet substantiated. Paradoxically, some persons fear the demise of hunting if the historical yearly increase in hunters is not sustained. But it is incongruous to believe that wildlife management can increase or even maintain the supply of game and its supporting habitat in the face of ever increasing demand. These are limits to growth! Another view is that a leveling off--perhaps even a little decline--in hunting participation will be a blessing in disguise to bring demand in balance with a constant or slowly decreasing

supply. The provision of quality hunting and maintenance of the sport as a rewarding and popular American activity depend on such a balance.

WHO ARE THE HUNTERS?

Surveys of the demographic characteristics of hunters--age, education, occupation, income, and residence--provide information important to resource managers. Like market surveys, these studies of game management clientele have direct implications for communicating, anticipating preferences and desires, and identifying the beneficiaries of a sport that draws on public resources.

The following demographic data are synthesized from numerous studies. In a strict sense, these studies cannot be added together or averaged because of differences in sample populations, research methods used, type of data collected, and categories used in reporting. However, we are attempting to present a "state of knowledge" composite based on existing information. The following figures were constructed and estimated around data described in detail in appendices 2 through 6.

To give perspective, we often compare hunter characteristics with those of the general population and wilderness recreationists. Wilderness use was selected for comparison because this activity, like hunting, is a strenuous outdoor activity. The characteristics of wilderness users have been well established by research. Following the presentation of data about the demography of hunters, the implications of this composite are considered.

Age

The age distribution for hunters is somewhat skewed toward older age classes compared with the general population (fig. 3 and appendix 2). Unlike the general population, which includes more older and younger persons, hunters are predominantly middle-aged adults. More than 40 percent are between 26 and 45 years old, although hunters are found in all age categories except the very young.

It is important to note that only 14 percent of all hunters are under 20 years old because studies indicate that most hunters--some 90 percent in one study (Klessig and Hale 1972)--are initiated into hunting before they reach 20 years of age. Population trends may indicate a decreased number of young people initiated into hunting in the future, because census data reveal a downward trend in the numbers in younger age groups in the U.S. population. The age group from 12 to 17 years dropped nearly 7 percent over a recent 5-year period and nearly 15 percent for the 18- to 24-age group (Slater 1972).

Education

Eighteen studies from nearly as many States show that hunters are fairly typical, averaging only slightly more education than the general population. A slightly greater proportion of hunters has gone beyond a high school education than the general public (fig. 4 and appendix 3). In this respect, hunters are more "average" than wilderness users, who tend to have much more education than the general population.

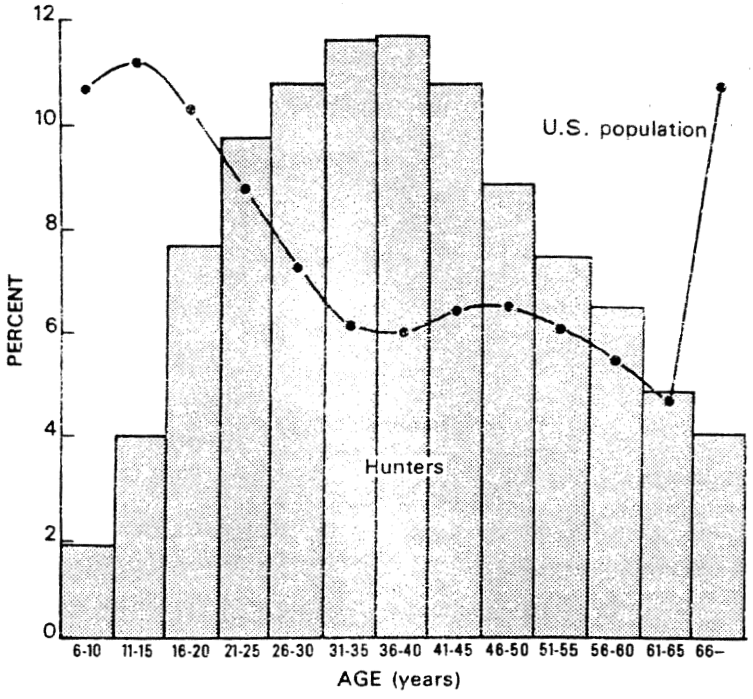

Figure 3.--Age distribution of U.S. hunters compared with U.S. population (see appendix 2 for specific hunter data from 20 studies).

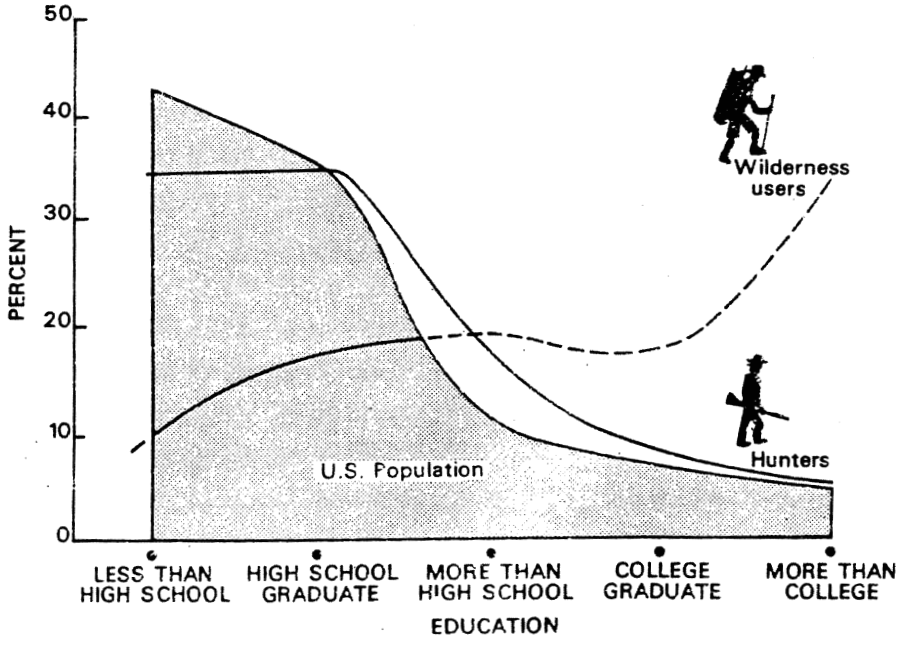

Figure 4.--Educational attainment of U.S. hunters, compiled from 18 studies, compared with the U.S. population and wilderness users (see appendix 3 for specific hunter data). Wilderness data source: Hendee (1967).

Occupation

The occupational distribution of hunters varies according to the region and type of hunting studied but closely resembles the general population (appendix 4). A synthesis of numerous studies shows hunters to be about 20-percent white collar and 40-percent blue collar with the rest distributed among sales, service, agriculture, and other categories.

Hunters are sometimes characterized as a blue collar group; but even though there may be more in this occupational category than in others, the distribution approximates the general population. Wilderness users, on the other hand, are drawn heavily from the ranks of professional and managerial occupations (Hendee et al. 1968, Vaux 1975).

Income

The income distribution of hunters approximates that of the general population, and hunters appear in all income brackets (fig. 5 and appendix 5).

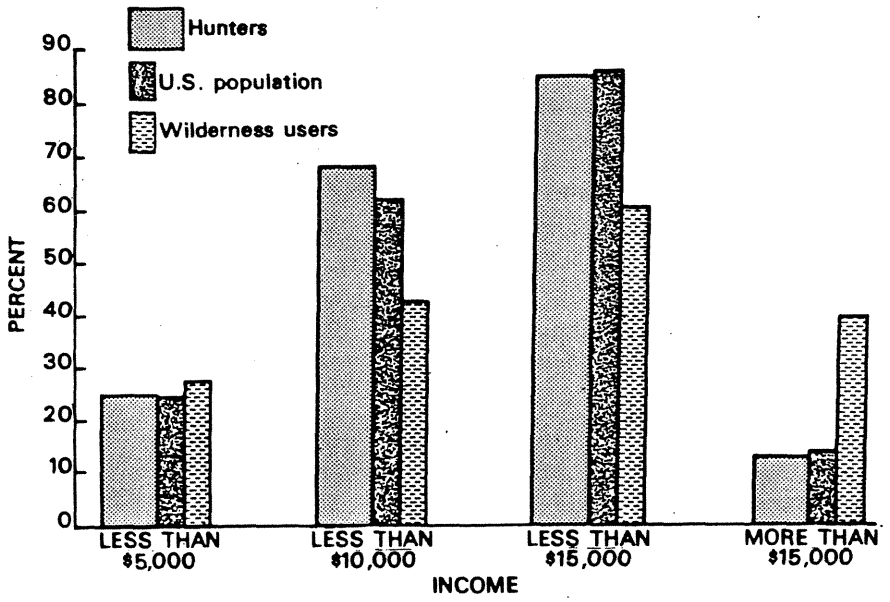

Figure 5.--Income of hunters compared with U.S. population and wilderness users (see appendix 5 for specific hunter data from 18 studies). Wilderness data source: Hendee (1967).

About 25 percent earn less than $5,000 annually, and 15 percent earn more than $15,000. Thus, hunting does not over-represent either the rich or the poor, although collectively these two groups account for nearly 40 percent of all hunters. Wilderness users, on the other hand, include a greater proportion (40 percent) from higher income groups. This is undoubtedly related to their higher educational and occupational classifications. Again, the main point is that hunters closely approximate the general population.

Residence

Whereas hunting is often described as an activity of rural residents (Outdoor Recreation Resources Review Commission 1960), data from 16 studies indicate the contrary (appendix 6). Only one study in the Southeast found more than half of the hunters had rural residences. On the other hand, six out of seven studies indicate that a majority of hunters spent part of their childhoods in rural areas.

IMPLICATIONS OF HUNTER CHARACTERISTICS

A composite view of the demographic characteristics of hunters indicates that hunters are primarily young to middle-aged adults, just slightly better educated than the general population, of average occupational classification and income, and primarily urban residents with rural backgrounds. Compared with both hunters and the general population, wilderness users have higher education, occupational classification, and income.

Some of the implications of these demographic data are as follows. The benefits of hunting, whatever they may be, are being distributed to a rather typical group of Americans. The fact that they hunt and are more likely to have a rural upbringing are about the only characteristics found to distinguish hunters from the rest of the U.S. population.

Most Americans reside in urban areas and so do hunters. But hunters tend to have been raised in rural areas. The decline in rural influences in America may signal a decline in activities associated with rural lifestyles and memories such as hunting.

A potential decline in hunting participation may also be implicit in the demographic breakdowns. Most hunters are introduced to the sport before they are 20 years old, but recent trends show recruitment into hunting is declining in the young age classes.

HOW ORGANIZED ARE HUNTERS?

The organization of hunters, including the proportion of hunters belonging to sportsmen's organizations and those who subscribe to sportsmen's magazines, reflects potential political strength and indicates the development of communication channels among hunters.

Ten studies (table 1) indicate that from 18 to 47 percent of hunters belong to sportsmen's organizations, but the average is about 25 percent. This makes hunters one of the most highly organized outdoor recreation groups, comparable to wilderness users, about 20 percent of whom belong to conservation groups or outdoor clubs (Hendee et al. 1969). Although many of the hunting and sportsmen's organizations are local, the powerful National Rifle Association, organized in 1871, claims over a million members. Additionally, one staunch antihunting personality points out that the following organizations are prohunting or at least do not oppose it: American Humane Society, Sierra Club, National Audubon Society, National Geographic Society, American Forestry Association, Wildlife Society, Izaak Walton League of Americans, National Wildlife Federation, and Boone and Crocket Club (Amory 1974). The point is that hunting has considerable backing.

Table 1.--Hunter membership in sportsmen's organizations

Location of study	Year studied	Population studied	Citation	Members
				Percent
Kansas	1967	Fish and Game Magazine readers	Zimmerman (1968)	46.9[a]
Maine	1965	Hunters and fishermen	Lobdell (1967)	18.5
Northeast	1965	Hunters	Bevins et al. (1968)	25.0
Ohio	1959	Hunters	Peterle (1961)	24.0
Pennsylvania	1965	Hunters	Sofranko and Nolan (1970)	27.3
Southeast	1971	Small game hunters[b]	Horvath (1974)	17.7
Texas	1973	Hunters	Berger (1974)	18.8
Washington	1971	Hunters	Potter et al. (1973b)	18.0
Wisconsin	1970	Waterfowl hunters	Eisele (1970)	36.0
Wisconsin	1968	Hunters	Klessig and Hale (1972)	22.0

[a] This figure is probably atypical because sportsmen's magazine readers are more likely to belong to sportsmen's organizations.

[b] Other hunter types include big-game hunters, 20.9 percent; waterfowl hunters, 28.5 percent.

A few studies have looked at the proportion of hunters who read sportsmen's magazines. Surprisingly, about 60-80 percent regularly read one or more sportsmen's magazines (Zimmerman 1968, Potter et al. 1973b). Outdoor Life, Field and Stream, and Sports Afield were by far the most widely read sportsmen's magazines, followed by local and regional sportsmen's newspapers and magazines.

Thus, hunters are relatively well organized and have a well-developed communication network, both prerequisites to political strength. Hunting values and information about issues of concern are continually disseminated to hunters. This organization and communication network will help foster the continuation of hunting and will protect it from adversaries.

WHY DO PEOPLE HUNT?

Philosophizing about why people hunt has been popular for a century or more, but only recently have motives for hunting been a topic for research. It is worthy of rigorous research because it can tell managers what kind of experiences hunters are seeking. From one perspective, the real products of game management are hunting experiences and the satisfactions and benefits to which they lead (Hendee 1974). Managers need to know what kinds of experiences are desired so they can manage game, land, and hunting conditions to produce an optimum mix of favored experiences.

At least 16 studies report why people hunted or yield other information related to hunters' motives and preferences.[4/] These studies, using different methods and conducted under varying conditions, have yielded consistent findings. Two important concepts emerge. First, there are several general pleasures or satisfactions that people get from hunting. Second, although harvesting game is an obvious goal of hunters, it is not reported as the only or primary satisfaction in hunting.

If we translate the many reasons (one study listed over 70) given for hunting in these studies into the conceptually similar pleasures or satisfactions they suggest, the following emerge: nature appreciation; companionship; shooting; using skills; vicarious enjoyment from anticipation, recall, hearing, and reading about hunts; harvesting game (success); displaying one's ability and success; using special equipment; physical exercise; recreational diversion; relaxation; escape from civilization; and esthetic enjoyment. Although the studies of hunters' motives and preferences use a variety of terminology, the satisfactions described above account for the most commonly reported attractions of hunting.

Harvesting game, or success, is an important satisfaction; but it is only one of many. A statewide study in Washington (Potter et al. 1973c) showed success ranked eighth--behind nature appreciation, escapism, companionship, and four other hunting satisfactions. Some minimum probability or level of success is important to hunters and is no doubt necessary to activate or enhance other hunting satisfactions, but most studies of motives for hunting indicate that other satisfactions are more important.

What these data indicate is that hunting is similar to other kinds of outdoor recreation in that it is a way of getting a variety of diverse satisfactions. With the amount of available game dwindling and success per hunter declining, hunting satisfactions other than success are likely to be even more important. Game and land managers must coordinate their efforts to provide hunters with quality experiences in a broad sense. The kinds of experiences available to hunters are strongly affected by management practices unrelated to game production--e.g., road access, camping opportunities, controls on congestion and crowding, communication efforts, and law enforcement.

4/ Davis 1962, Kirkpatrick 1965, Davis 1967, Ashcroft 1967, Bevins et al. 1968, Garrett 1970, Klessig and Hale 1972, Doll and Phillips 1972, Haulsee et al. 1973, More 1973, Potter et al. 1973b, Potter et al. 1973c, Schole et al. 1973, Stankey et al. 1973, Kennedy 1974, Horvath 1974.

Since hunters seek a variety of experiences, managers can satisfy more hunters by providing a full spectrum of hunting opportunities. Then hunters can pick and choose the kinds of experiences they want rather than being forced into a homogeneous mold. Unfortunately, some activities in resource management operate against diversity. For example, increasing the number of roads in managed forests eliminates opportunity to stalk game away from civilized improvements and encourages only "road hunting". Likewise, the need to sell more and more hunting licenses to generate needed revenue tends to produce quantity rather than quality hunting.

SOME CURRENT ISSUES

Antihunting Sentiment

Hunters and game managers are concerned about the potential influence of antihunting sentiment on the acceptability of the sport. Part of the anxiety arises from not knowing the effect that antihunting commentary may have on broader public opinion and its subsequent impact on hunting as an activity managed primarily by public agencies.

How many people oppose hunting, and what are their reasons? The findings of five studies are illuminating. Two studies in New Jersey revealed that a large proportion (38 percent in 1972 and 43 percent in 1974) of the general population disapproved of deer hunting. Although those that approve still outnumber those that disapprove, the margin has declined from 16 to 6 percent in 2 years (Applegate 1973, Applegate 1975). Opposition to hunting in New Jersey was associated with urban residence and appears to be stronger than in some other regions. A study in 11 Southeastern States found only 5.5 percent of the population opposed to hunting (Horvath 1974).

Dale Shaw (1973) studied antihunting attitudes among students in five universities across the country on the premise that these young adults will occupy future positions of influence. He found that 75 percent of the students expressed some antihunting or antihunter sentiment, and 19 percent were totally against sport hunting. In another study, William Shaw (1974) found antihunting opposition grounded in negative attitudes about the behavior of hunters, sympathy for individual animals as victims, and concern about the disruption of nature's balance.

At least 25 organizations, all but 4 being national or international in scope, have been identified with an antihunting objective (Frodelius 1973). In 1973 these groups claimed a total membership of 314,000 persons. Frodelius determined that the antihunting opinions of these organizations rested on negative reactions toward killing of wildlife, methods of hunting, management methods, fear of wildlife extinction, and to hunters as a class of people.

The issue of antihunting sentiment provokes "heat" whenever it comes up among game managers or hunters, both of whom understandably feel their interests are threatened. Resource managers must recognize that the issue involves a conflict of values--a situation that may be better understood, but not resolved, by any objective assessment of the logic underlying divergent views. Antihunting groups reflect one value system resting on a variety of supporting reasons. Likewise, prohunting advocates hold just as strongly to their view based on many other reasons. Attacks on the reasons underlying these divergent perspectives

will not necessarily change either the orientations or the values of those who hold them. But by knowing more about the basis for antihunting sentiment, managers and hunters can minimize their vulnerability to criticism.

What can game managers and hunters do to disarm the criticism of antihunters? Several things seem important. First, hunter information, training, and safety programs need renewed emphasis to reduce hunting accidents, promote sportsmanship, instill a conservation ethic, build respect for property owners, and bring the realization among all hunters that their behavior contributes to an image of hunting that may affect its acceptability to the public at large.

Second, more effective programs are needed to promote and extend wildlife related law enforcement including trespass and property protection regulations. Soliciting hunter cooperation in reporting game violations may be helpful in pursuing this goal under current shortages of agency money and manpower. Several States have initiated such programs.

Third, hunting literature, advertising, and movies should be encouraged to feature positive recreational and esthetic aspects of hunting. The killing of game animals and trophy hunting should not be emphasized since they are only two of the many aspects of the sport that attract hunters. Hunting should be featured as a source of varied, recreational satisfactions and healthy outdoor activity. That's what it really is.

Fourth, better definitions are needed of what is or is not acceptable sport hunting, and the responsibilities of sportsmen, game managers, and landowners in enforcing such a code.

Who should take the leadership role in promoting and implementing the above recommendations? The authors feel this is the proper role for State game agencies because they are at the fulcrum, balancing the concerns of sportsmen and landowners while being legally responsible for game populations. The president of the Wildlife Management Institute (Poole 1971) makes this same point very emphatically; "we cannot wait much longer in some areas. State agencies have got to face up to their responsibilities, even to the point of ramming it down the throats of sportsmen where the alternatives are clear." And we might add that the State agencies' very survival may depend on such forceful action if current critics of hunting are to be denied real world examples of situations and incidents that fuel antihunting sentiments.

The impact of antihunting sentiment on resource management will be negotiated, in large part, through political processes. There is some concern that endorsement of hunting is decreasing, especially among college students and urban residents. This may combine with other factors such as diminished hunting opportunity, rural lifestyles and values, and population trends to reduce future numbers of hunters. On the other hand, the political base of hunters in sportsmen's organizations and their network of communication through sportsmen's magazines still seem a powerful force for protecting the future of hunting.

Nonconsumptive Wildlife Use

Nonconsumptive or appreciative use of wildlife is becoming more prevalent according to a 1970 survey indicating the presence of 6.3 million birdwatchers and 4.5 million bird and wildlife photographers (U.S. Department of the Interior 1972). A study in 11 Southeastern States found that over half the households surveyed each averaged 146 days of birdwatching (Horvath 1974).

This use produces economic expenditures amounting to millions. The total direct expenditures for the enjoyment of nongame birds, for example, were estimated at $500 million in 1974. Expenditures for birdseed, binoculars, and camera equipment constituted 95 percent of this total (Payne and DeGraaf 1975).

Most wildlife managers enthusiastically applaud this widening horizon of their professional responsibility. But they are dismayed that so little is known about the kind and extent of appreciative use of wildlife species by a growing segment of the public. Some managers are apprehensive about growing demands to manage for wildlife appreciation while there is scarcely enough time and money for game management which pays the bills. This anxiety is well founded since 62 percent of all wildlife management money comes from hunting and fishing license sales, another 20 percent from tax on guns and ammunition and only 5 percent from general State tax revenues (Wildlife Management Institute 1973). Innovative approaches to finance nonconsumptive wildlife such as sale of wildlife stamps and personalized license plates either have failed or have fallen well short of management needs and expectations. Some equitable and long-term financing of nonconsumptive wildlife management is desperately needed. Nonhunting programs should not be carried out at the expense of hunting interests but in addition to them with separate and adequate funding. General tax revenues are one logical source, but these will require good supporting information about the extent of wildlife appreciation among the public, the benefits derived, and how management programs can optimize them.[5/] In the meantime, minimizing conflicts between the two uses is an obvious challenge to resource management. Skillful management can minimize conflicts between consumptive and nonconsumptive uses by separating them over time, space, and use of wildlife habitat and populations. The impact of growing nonconsumptive uses of wildlife on hunting will depend, in large part, on how well managers meet this challenge.

CONCLUSION

Future increase in sales of hunting licenses is indicated by the data. However, this may change as evidenced by a stabilized proportion of the population that hunts and in response to increasing antihunting sentiment, urbanization of American society, population changes, competition for wildlife, habitat and game populations, and conflicts in wildlife values. This is not to suggest that hunting will die out altogether. About 20 percent of all hunters belong to sportsmen's organizations, a political advantage; in even the heavily urbanized and populated regions of the country such as the Northeast,

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[5/] Recent research on nonconsumptive wildlife include: Gray 1975, U.S. Department of Agriculture 1975, Noges and Progulske 1974, Kellert 1974, Hansen and Simmons 1974, Schweitzer et al. 1973.

where hunting participation is lowest, stable trends in hunting participation have prevailed for years (U.S. Department of the Interior 1956, 1961, 1967, 1972). Stabilized or even slight decline in participation may help balance supply of hunting opportunities and demands leading to better quality hunting. The strong emergence of nonconsumptive uses suggests that total wildlife management--for hunting and nonconsumptive appreciation--will be an increasingly important consideration for resource management.

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Appendix 1.--Hunter study description

Location of study	Population studied	Year studied	Publication citation	Usable response	Percent response rate	Study method
Arizona	Hunters and fishermen	1960	Davis (1962)	1,029	--	Interview
Arizona	Hunters and fishermen	1965	David (1967)	1,000	--	Interview
Arizona	Hunting and fishing households	1970	Gum et al. (1973)	2,985	19.9	Mail questionnaire
California	Hunters	1959-60	Folkman (1963)	3,260	31	Mail questionnaire
Colorado	Hunters and fishermen	1966-67	Nobe and Gilbert (1970)	1,865	--	Interview
Kansas	Fish/game magazine readers and Wildlife Federation members	1967	Zimmerman (1968)	363	68.5	Mail questionnaire
Maryland	Deer hunters	1969	Kennedy (1974)	373	82	Mail questionnaire
Massachusetts	Hunters	1970	More (1973)	325	69.6	Mail questionnaire
Massachusetts	Hunters and fishermen	1965	Sendak and Bond (1970)	1,070	64.3	Mail questionnaire
Michigan	Hunters	1966	Jamsen (1967)	12,425	--	Agency records
Michigan	Preserve hunters	1969	Greene (1970)	241	71	Questionnaire
Michigan	Deer hunters	1968	Ryel et al. (1970)	--	--	Miscellaneous
Michigan	Deer hunters	1968	Moncrief (1970)	336	85	Interview
Michigan	Deer hunters	1966 and 1968	Ryel (1971)	336	93.9	Questionnaire
Michigan	Deer hunters	1971	Haulsee et al. (1973)	3,513	67	Mail questionnaire
Nevada	Hunters	1967-68	Garrett (1970)	--	--	Mail questionnaire
New Mexico	Hunters and fishermen	1963	Kirkpatrick (1965)	3,648	53	Mail questionnaire
North Carolina	Small game hunters	1964-65	James et al. (1969)	445	--	Interview
Ohio	Hunters	1959	Peterle (1961)	1,100	59.2	Mail questionnaire
Pennsylvania	Hunters	1965	Sofranko and Nolan (1970)	318	77.2	Mail questionnaire
Texas	Hunters	1972-73	Berger (1974)	1,581	46.4	Mail questionnaire
Utah	Elk hunters	1966	Ashcroft (1967)	517	41	Questionnaire
Washington	Pheasant hunters	1971	Potter et al. (1973b)	1,062	87.3	Mail questionnaire
Washington	All Washington hunters	1971	Potter et al. (1973c)	5,540	85	Mail questionnaire
West Virginia	Hunters	1967	Thomas and Pack (1968)	1,353	--	Interview
Wisconsin	Hunters	1968	Klessig and Hale (1972)	1,035	69	Mail questionnaire
Wyoming	Resident big game hunters	1970	Doll and Phillips (1972)	--	--	Mail questionnaire
Northeast[a/] (6 States)	Hunters	1965	Bevins et al. (1968)	6,589	69	Mail questionnaire
Southeast[b/] (11 States)	Hunters	1971	Horvath (1974)	9,332	77.25	Interview
National	All hunters	1955	U.S. Department of the Interior (1956)	--	--	Interview
National	All hunters	1961	U.S. Department of the Interior (1961)	--	--	Interview
National	All hunters	1965	U.S. Department of the Interior (1967)	--	--	Interview
National	All hunters	1972	U.S. Department of the Interior (1972)	--	--	Interview

[a/] Maine, Massachusetts, New York, Pennsylvania, Vermont, and West Virginia.

[b/] Arkansas, east Texas, Georgia, Kentucky, Louisiana, Maryland, Mississippi, South Carolina, Tennessee, Virginia, and West Virginia.

Appendix 2.--Age distribution from 20 studies in 14 States and 1 regional study

Location	Year studied	Population studied	Citation	Hunter age in years: 5–9	10–14	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64	65 and older	Total percent
				Percent													
Arizona	1960	Hunters and fishermen	Davis (1962)			12.6	8.5		22.0		26.6		17.9		8.6	3.5	100
Arizona	1965	Hunters and fishermen	Davis (1967)			12.0	6.6		18.7		25.8		20.5		12.4	3.8	100
California	1959-60	Hunters	Folkman (1963)	2.2	8.8	6.4	8.3	13.5	14.8	13.4	10.8	8.4	6.3	3.0	3.5		99[a]
Colorado	1966	Hunters and fishermen	Nobe and Gilbert (1970)			15.8			27.9		28.2		17.1		11.0		100
Maine	1965	Hunters and fishermen	Lobdell (1967)		10.8		19.1		21.2		19.5		16.1		13.3		100
Massachusetts	1965	Hunters	Sendak and Bond (1970)	23.0		22.0		20.0		16.0		10.0		5.0		4.0	100
Michigan	1966	Deer hunters	Jamsen (1967)	7.0	8.2	11.5	12.0	11.1	10.5	9.9	8.9	7.3	5.3	4.0	4.3		100
Michigan	1968	Deer hunters	Ryel et al. (1970)	0	2	14	12	13	11	10	10	8	7	6	4	4	101[a]
Michigan	1968	Deer hunters	Ryel (1971)		3	9	11	13	11	10	8	10	8	5	5	3	96[a]
Michigan	1967	Deer hunters	Watson et al (1972)			23		24		22		15		12		4	100
New Mexico	1963	Hunters	Kirkpatrick (1965)	1	5	12	11		27		26			17		1	100
North Carolina	1964-65	Small game hunters	James et al. (1969)			21			25		27		18		9		100
Northeast (6 States)[b]	1965	Hunters	Bevins et al. (1968)		13		24		21		19		13		10		100
Ohio	1959	Hunters	Peterle (1961)		10		17		20		22			31			100
Texas	1973	Hunters	Berger (1974)		3		24		25		23		18		7		100
Washington	1971	Pheasant hunters	Potter et al. (1973b)		15		11		28		21			21		4	100
Washington	1971	Hunters	Potter et al. (1973b)		17		11		24		19			25		4	100
West Virginia	1967	Hunters	Thomas and Pack (1968)		12						84					4	100
Wisconsin	1968	Hunters	Klessig and Hale (1972)		20		28		16		15		11		8		100
Wyoming	1970	Big game hunters	Doll and Phillips (1972)			15	8	10		21		18			21	7	100

[a] Data reported in study did not total 100 percent.

[b] Maine, Massachusetts, New York, Pennsylvania, Vermont, and West Virginia.

Appendix 3.--Levels of hunter education from 18 studies in 12 States, 2 regional, and 2 national surveys. Circled percentages indicate the exact proportion under that category

Location	Year studied	Population studied	Citation	Less than high school graduate	High school graduate	Some college	College graduate	Post graduate	Total percent
				6 9 10	11 12	13 14	15 16	17 18 19 20	
				Percent					
Colorado	1966-67	Hunters and fishermen	Nobe and Gilbert (1970)	20	47	24		9	100
Maine	1965	Hunters and fishermen	Lobdell (1967)	46	(34)	14		6	100
Massachusetts	1965	Hunters	Sendak and Bond (1970)	37	(35)	18	(7)	3	100
Michigan	1969	Preserve hunters	Greene (1970)	14		44		42	100
Michigan	1967	Deer hunters	Watson et al. (1972)	38	(37)	17	(3)	5	100
National	1965	Hunters	U.S. Department of the Interior (1967)	43	(38)	10		9	100
National	1970	Hunters	U.S. Department of the Interior (1972)	40	(37)	11	(7)	5	100
New Mexico	1963	Big game hunters	Kirkpatrick (1965)	44	(28)	15	(6)	7	100
North Carolina	1964-65	Small game hunters	James et al. (1969)	32 18	36	6	2	6	100
Northeast (6 States)[a/]	1965	Hunters	Bevins et al. (1968)	41	(37)	13		9	100
Ohio	1959	Hunters	Peterle (1961)	41	(50)	3		6	100
Pennsylvania	1965	Hunters	Sofranko and Nolan (1970)	17 69		6		7	99[b/]
Southeast (11 States)[c/]	1971	Hunters	Horvath (1974)	13 24	42		18	3	100
Texas	1973	Hunters	Berger (1974)	15	(24)	35	(15)	10	99[b/]
Washington	1971	Pheasant hunters	Potter et al. (1973b)	23	(35)	22	(11)	10	101[b/]
Washington	1971	Hunters	Potter et al. (1973b)	33	(37)	18	(6)	5	99[b/]
Wisconsin	1968	Hunters	Klessig and Hale (1972)	25	(41)	13	(12)	9	100
Wyoming	1970	Big game hunters	Doll and Phillips (1972)	26	(32)	20	(12)	10	100

[a/] Maine, Massachusetts, New York, Pennsylvania, Vermont, and West Virginia.

[b/] Data reported in study did not total 100 percent

[c/] Arkansas, east Texas, Georgia, Kentucky, Louisiana, Maryland, Mississippi, South Carolina, Tennessee, Virginia, and West Virginia.

Appendix 4.--Hunter occupations from 22 studies in 13 States and 2 regional studies

Location	Year studied	Population studied	Citation	White collar	Sales, kindred	Blue collar laborers	Service	Agricultural	Retired	Student	Unemployed	Other	Total percent
				Percent									
Arizona	1960	Hunters and fishermen	Davis (1962)	28	5	49	5	5				9	101[a]
Arizona	1965	Hunters and fishermen	Davis (1967)	25	7	45	9	4				10	100
California	1959-60	Hunters	Folkman (1963)	18	10	38	5	6	3	10	1	9	100
Colorado	1966-67	Hunters and fishermen	Nobe and Gilbert (1970)	37	6	43		4	7	1		2	100
Maine	1965	Hunters and fishermen	Lobdell (1967)	12	29	44	(see Sales)					15	100
Massachusetts	1965	Hunters and fishermen	Sendak and Bond (1970)	24	14	40	13	2				7	100
Michigan	1969	Preserve hunters	Greene (1970)	53	14	19	6	0	1	← 7 →			100
Michigan	1962-66	Deer hunters	Ryel (1971)	14	4	50	6	4	6	11	1	3	99[a]
Michigan	1968	Deer hunters	Moncrief (1970)	32		52		3	← 13 →				100
New Mexico	1963	Hunters and fishermen	Kirkpatrick (1965)	← 87 →					← 13 →				100
Northeast (6 States)[b]	1965	Hunters	Bevins et al. (1968)	15	12	42	12	7				12	100
Ohio	1959	Hunters	Peterle (1961)	13	4	56	9	6		12			100
Pennsylvania	1965	Hunters	Sofranko and Nolan (1970)	13	13	42	9	6				17	100
Southeast (11 States)[c]	1971	Hunters	Horvath (1974)	30	5	38	5	8	9	1	2	3	101[a]
Texas	1973	Hunters	Berger (1974)	54		16		6	← 12 →				88[a]
Washington	1971	Pheasant hunters	Potter et al. (1973b)	31	10	30		2	6	14		7	100
Washington	1971	Hunters	Potter et al. (1973b)	20	9	39		3	6	17		6	100
Wisconsin	1968	Hunters	Klessig and Hale (1972) Klessig (1970)	19	4	41	3	8		25			100
Wyoming	1970	Big game hunters	Doll and Phillips (1972)	40	3	31	5	14	3	2		2	100

[a] Data reported in study did not total 100 percent.

[b] Maine, Massachusetts, New York, Pennsylvania, Vermont, and West Virginia.

[c] Arkansas, east Texas, Georgia, Kentucky, Louisiana, Maryland, Mississippi, South Carolina, Tennessee, Virginia, and West Virginia.

Appendix 5.--Percent income Distribution from 18 studies in 13 States and 2 regional studies

Location	Year studied	Population studied	Citation	Income in thousands of dollars							Total percent
				5	10	15	20	25	30	35 and above	
Arizona	1960	Hunters and fishermen	Davis (1962)	8	17	34	24	10		5	98[a]
Arizona	1965	Hunters and fishermen	Davis (1967)	6	9	28	31	18		8	100
Colorado	1966	Hunters and fishermen	Nobe and Gilbert (1968)	6	5	26	8	25	14	16	100
Maine	1965	Hunters and fishermen	Lobdell (1967)	13	17	26	16	11	6	3	8	100
Massa-chusetts	1965	Hunters and fishermen	Sendak and Bond (1970)	9	13	29	24	10	6	3	6	100
Michigan	1969	Preserve hunters	Greene (1970)	2	15	23	28	32				100
Michigan	1968	Deer hunters	Moncrief (1970)	4	4	19	27	28		8		90[a]
New Mexico	1963	Big game hunters	Kirkpatrick (1965)	8	18	28	29	13	3	1		100
North Carolina	1964-65	Small game hunters	James et al. (1969)	27	31	30	9	3				100
Northeast (6 States)[b]	1965	Hunters	Bevins et al. (1968)	11	17	28	20	11	6	2	5	100
Ohio	1959	Hunters	Peterle (1961, 1967)	22	24	35	11	8				100
Penn-sylvania	1965	Hunters	Sofranko and Nolan (1970)	11	15	28	21	13	4	8		100
Southeast (11 States)[c]	1971	Hunters	Horvath (1974)	11	13	16	21	20	8	3	4		96[a]
Texas	1972	Hunters	Berger (1974)	6	21	33	18	10	4	2	6		100
Washington	1971	Pheasant hunters	Potter et al. (1973b)	7	15	31	21	11		15			100
Washington	1971	Hunters	Potter et al. (1973b)	13	21	29	18	8		10			99[a]
Wisconsin	1968	Hunters	Klessig and Hale (1972), Klessig (1970)	12	10	21	18	18	12	9			100
Wyoming	1970	Big game hunters	Doll and Phillips (1972)	5	11	25	31	18					90[a]

[a] Data reported in study did not total 100 percent.

[b] Maine, Massachusetts, New York, Pennsylvania, Vermont, and West Virginia.

[c] Arkansas, east Texas, Georgia, Kentucky, Louisiana, Maryland, Mississippi, South Carolina, Tennessee, Virginia, and West Virginia.

Appendix 6.--Hunter and hunter childhood residence from 16 studies in 13 States and 1 regional study

Location	Year studied	Population studied	Citation	Hunter residence		Childhood residence	
				Rural	Urban	Rural	Urban
				Percent			
California	1959-60	Hunters	Folkman (1963)	33.3	67.4		
Maine	1965	Hunters	Lobdell (1967)			78.1	21.9
Maryland	1969	Deer hunters	Kennedy (1974)	33.0	67.0	44.0	56.0
Massachusetts	1965	Hunters	Sendak and Bond (1970)			58.0	42.0
Michigan	1961-62	Hunters	Palmer (1966)			60.0	40.0
Michigan	1969	Preserve hunters	Greene (1970)				
New Mexico	1963	Hunters and fishermen	Kirkpatrick (1965)	37.8	62.2		
North Carolina	1964-65	Small game hunters	James et al. (1969)	64.0	36.0		
Ohio	1959	Hunters	Peterle (1961)			58.0	42.0
Pennsylvania	1965	Hunters	Sofranko and Nolan (1970)			69.4	30.6
Southeast (11 States)[a/]	1971	Hunters	Horvath (1974)	61.2	38.8		
Texas	1973	Hunters	Berger (1974)	33.7	66.3	62.4	37.5
Washington	1971	Pheasant hunters	Potter et al. (1973b)	49.0	51.0		
Washington	1971	Hunters	Potter et al. (1973b)	70.0	30.0		
Wisconsin	1968	Hunters	Klessig (1970)			62.0	38.0
Wyoming	1970	Big game hunters	Doll and Phillips (1972)	32.0	68.0		

[a/] Arkansas, east Texas, Georgia, Kentucky, Louisiana, Maryland, Mississippi, South Carolina, Tennessee, Virginia, and West Virginia.

TOPIC IV

SOCIAL AND INSTITUTIONAL CONSIDERATIONS

ABSTRACTS

DRIVER

Toward a Better Understanding of the Social Benefits of Outdoor Recreation Participation.--This paper proposes that recreation resource managers need to give more attention to the benefits that a person derives from participation in recreation activities. Behavioral information is described as one of several types of knowledge needed in recreation planning and management decisions. A model outlining the dynamics of a recreationist's behavior is presented. Within that model sequences of specific types of recreation behavior are traced from: deciding on a particular recreation activity, planning and preparation, on-site engagement, recall, realizing satisfying experiences, to gaining the ultimate benefits these experiences can produce. Personal and social benefits of recreation participation are defined as the ways in which an individual functions or performs more effectively because of his having participated in a recreation activity. The importance to recreation resource management of information on these benefits is described as is the stage of knowledge for identifying and measuring them. Throughout, the need for additional research is emphasized.

ERICKSON AND DAVIS

Public Involvement in Recreation Resources Decision Making.--In response to legal and administrative requirements, federal natural resource agencies are involving citizens in the decision making process. However, given the arguments stated both for and against public involvement, one might raise a question about the proper role of involvement in agency decision making. While twelve general principles of public involvement and a number of relatively new public involvement techniques, e.g., public information brochure, nominal group and Delphi, are discussed, research has not progressed to the point where "formulas" for involvement can be given. Agency cooperation is vitally needed to permit a comparative evaluation of alternative techniques.

LAPAGE

New Roles for Government and Industry in Outdoor Recreation.--The examination of some possible future options for public parks and recreation agencies is necessitated by 3 hard facts: 1. the rising dominance of the private sector, 2. the emerging public revolt against increased tax supported programs, and 3. the trend toward greater public involvement in agency decision-making. A central role for public parks and recreation agencies is seen to be that of a cooperator with the private sector, taking such forms as joint development planning, increased use of concession-operated public facilities, and new directions for public parks and recreation programs.

TOWARD A BETTER UNDERSTANDING OF THE SOCIAL BENEFITS OF OUTDOOR RECREATION PARTICIPATION

B. L. Driver[1/]

Abstract.--This paper proposes that recreation resource managers need to give more attention to the benefits that a person derives from participation in recreation activities. Behavioral information is described as one of several types of knowledge needed in recreation planning and management decisions. A model outlining the dynamics of a recreationist's behavior is presented. Within that model sequences of specific types of recreation behavior are traced from: deciding on a particular recreation activity, planning and preparation, on-site engagement, recall, realizing satisfying experiences, to gaining the ultimate benefits these experiences can produce. Personal and social benefits of recreation participation are defined as the ways in which an individual functions or performs more effectively because of his having participated in a recreation activity. The importance to recreation resource management of information on these benefits is described as is the state of knowledge for identifying and measuring them. Throughout, the need for additional research is emphasized.

Keywords: recreation benefits, recreation aspirations, recreation experiences.

This paper is addressed to three questions: (1) Why should recreation resource planners and managers give more attention to the human benefits "produced" from recreation opportunities? (2) How can information on these benefits be obtained? and (3) How does this behavioral information fit with the other types needed in planning and management?

The word "benefit" is used in reference to how participation in recreation activities enhances or imporves the user's ability to function more effectively after having participated. Such improved functioning could be physiological (better physical health), psychological (improved mental health) or sociological (increased commitments of recreationists to wise resource management because of knowledge gained from participation). Also, the improvements in effective functioning could be realized on the job (greater volume or increased quality of work accomplished), at home (increased family solidarity), or in any environment.

The words "recreation experiences" are used in a context that should be explained. At a broad level, a recreation experience is the sum of a participant's mental, spiritual, physiological or other responses to a recreational engagement. Such an overall experience might be satisfying or pleasurable,

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or it might not be satisfying; there are "bad" as well as"good" experiences. At this broad level there are general activity-dependent experiences, such as a white-water canoeing experience for example. This general experience would include all responses from anticipation to recall (Clawson and Knetsch 1966). At a narrower level there are several specific experiences associated with participation in a particular activity. These specific experiences help define the attractiveness of an activity or environment to a particular user group and the type of satisfaction realized from that activity. In white-water canoeing, specific experiences could include: taking risks, testing skills, being with like-minded associates, exercising, enjoying nature, displaying equipment, introspecting-seeking privacy, or avoiding temporarily a problem experienced back home or on the job. These might be called the specific attributes that define a general white-water canoeing experience. Each will be giving satisfaction (or dissatisfaction) simultaneously, but some will be more satisfying than others.[2/] For that reason potential white-water canoers will value some of these specific experiences higher than others when deciding whether or not to make a white-water canoeing trip.

Some specific experiences are highly dependent on the characteristic of the physical resources (fast water). Others are more dependent on the facilities or equipment (sturdy canoes) and still others on the characteristic of the users (personality trait, age, sex, etc...; or interpersonal things such as a desire to win the approval of others). The degree of "resource-dependency" varies between activities. For example, some experiences (matching wits with a trophy deer, skillfully negotiating the rapids, learning about prehistoric man, enjoying a spectacular view) are more dependent on the physical resources than are others (being with friends, exercising, general nature learning, etc.). The trick in management is to allocate the resources to their highest potential for providing opportunities for specific desired experiences and their consequent human benefits.

PURPOSES

The tasks assigned for this paper were:

1. To describe the state of knowledge for identifying and measuring the personal-social benefits of recreation,[3/]

2. To interpret the relevancy of that body of knowledge for recreation resource planning and management, expecially those operating in the public sector, and

3. To outline important research needs on that subject.

[2/] Elsewhere, these simultaneously occurring experiences have been identified as a "package of experiences" (Driver and Tocher, 1974) and as "multiple satisfactions" (Hendee 1974).

[3/] The words "personal" and "social" benefits are used interchangeably in the paper. Alternative words could be "private" benefits (to the user) and "collective" benefits (to others because of an individual's participation) so long as enhanced effective performance of the participant (or of others) is the criterion.

The first task is both easy and impossible. It is easy to say that the state of the art is in its embryonic stage because relatively little research has been directed at quantification of recreation benefits. This "easy out" begs the question, though. Many theories and methods in the behavioral sciences are applicable to the subject of this paper even though few of these applications have been made. It is an impossible task, however, to consider the many diverse theories of human behavior which can be interpreted with respect to what they might say about man's beneficial psychological, physiological or sociological responses to recreational engagement. These theories range from Freud's (1955) and Piaget's (1962) thoughts on the value of play in social and cognitive development through Berlyne's (1960, 1969) concepts regarding arousal seeking and exploratory preferences to the work of physiologists and parapsychologists on relationships between mind control techniques and physical-mental relaxation.

Because of the complexity of the subject, this paper will describe only one approach to identifying and measuring the personal-social benefits of recreation and discuss briefly the state of knowledge about that approach. That approach has been followed in recent years by a growing number of researchers who feel it is theoretically realistic, managerially relevant and relatively easily understood by managers who do not have intensive training in the social or human behavioral sciences. Briefly, the approach adopts the view that most human behavior is purposeful, in that recreationists select particular activities because of the satisfying experiences they expect and desire from that activity.

Future research needs are a part of the discussion because of the limited number of studies conducted so far on recreation benefits. Throughout, the importance to managers of information on recreation benefits is emphasized. Also, footnotes are used frequently to qualify concepts that might be novel and to help avoid possible misinterpretation.

WHY CONSIDER PERSONAL BENEFITS?

Numbers of visitors to outdoor recreation areas have increased by greater than a 5 percent compound annual rate for the past several decades. In the most recent years, the rate has been even higher, up to 15 to 20 percent, for specific areas and activities such as back-country and lift skiing. These are interesting statistics when compared with selected baseline social indicators. Increases in population and personal disposable income have both increased at less than 3 percent per year, and per capita consumption of energy (in BTU's) has increased at less than 5 percent during the past decade.

Despite these trends in use and the fact that each year more resources are allocated to supply additional recreation opportunities, we do not have adequate measures of the social costs and benefits of these allocations.

This paper does not consider the costs or all of the different types of benefits. Instead, it focuses on a particular type of benefit which is defined behaviorally in terms of user response.[4/] The major thesis is that,

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[4/] In addition to the increased effective functioning of the recreationists, other benefits of recreation allocations could include: local income benefits; benefits to animal species from hunting-generated revenues; and preservation of options for future generations to benefit.

within this behavioral perspective, several limitations in knowledge are especially constraining. In particular, more objective measures are needed of the following four related sets of variables:

1. The attributes (or characteristics) of the physical (and social) setting that are perceived by potential users to be necessary for a quality recreation experience.

2. The type and number of recreation experiences sought from specific recreation environments both on-site and by "appreciative" off-site users, who enjoy the existence of these opportunities and desire to preserve the options for possible on-site engagement by themselves or others.

3. The characteristics of potential and actual recreationists having demands for different types of recreation experiences and the cause-effect relationships between these characteristics and recreation demand.

4. The personal experiences and benefits realized from specific recreation opportunities.

Such measures would not be needed in recreation planning and management if our intuitions and judgments about recreation aspirations, experiences and benefits are realistic. Past studies have indicated, however, that the managers' intuitions and the users' opinions about the recreational values of the facilities frequently differ (Lucas 1964, Hendee and Harris 1970, Clark et al. 1971, and Peterson 1971 and 1974b).

In the past, policy makers and planners have had to define these values intuitively because there was little else to go on. And they have done a good job, given the budgets and the complexity and uncertainty within which they were working. However, as the demands grow for all of the goods and services produced by our nation's natural resources, more objective measures are needed; in the face of this increased relative scarcity managers no longer have the room for error they once did in their decision processes.

Objective measures of recreation values are especially needed in allocation decisions to compare the social benefits and costs of different types of recreation opportunities and the values receivable from alternative uses. For example, past measures of the outputs of recreation areas have used variables such as numbers of visitors and visitor days. Although necessary in planning and management decisions, these variables are little more than counts of people using the system and do not tell us much about the number, type and magnitude of benefits produced. The major problem is that counts of users are of too little value in defining managerial objectives (or even policy guidelines) about what specifically is to be produced or in evaluating the degree to which these objectives are realized. It is hard to "manage by objectives" when realistic, relevant and quantifiable targets cannot be set to measure accomplishments. And numbers of users are not completely adequate targets.

By analogy, we have a better understanding of what other social service "systems" (education, sanitation, communication, housing, transportation and medicine) are "doing for" the users of those services. For example, if counts of users were the primary guide for the administration of colleges, common management operations would become less relevant. These would include establishing entrance requirements, screening faculty, designing curricula, administering qualifying exams and maintaining standards for certification. Each of these operations exists to help assure a quality product rather than to accommodate as many students as possible.

What is being suggested is that the management of recreation resources is a production process, as is timber management, wildlife management and watershed management. The problem is that the "products" of recreation management are harder to define.5/ Nevertheless, we need to go beyond the conventional wisdom that the product of recreation management is recreation opportunities and identify more clearly what it is that these opportunities do for the user. This idea has been elaborated elsewhere (Hendee 1974, Driver and Brown 1975)6/.

5/ This inadequate definition of the social values of recreation has probably contributed to the view that recreation goods and services are of less relative importance to society than are other goods and services that compete locally and nationally for scarce budgets and other resources. For example, established recreation areas are frequently converted to housing, sewer, and highway developments.

6/ It is beyond the scope of this paper to elaborate on the additional relevance to management of better information on user expectations, experiences and benefits. It might be useful to footnote, however, that this information is fundamental to the resolution of several problems within the field of outdoor recreation resource management. These include: (1) identifying more clearly what recreational benefits can (and should) be produced most appropriately by different public and private agencies; (2) defining better the "merit good" aspects of recreation behavior (i.e., to what degree does one person's recreation participation benefit other people who do not participate) in an attempt to help identify the degree to which specific opportunities should be financed through taxation by all users who benefit either directly or indirectly or alternatively through user prices, when benefits are limited primarily to the participants; (3) determining relationships between recreation behavior and "off-system" variables such as those defining the users' home and work environments; (4) defining latent demands of those potential users not included in statistics on past use rates; (5) identifying and appraising trade-offs and substitutibilities between different recreation activities and between recreation and other uses of the same resources; (6) determining the probable "performance" of physical-resource settings in meeting user expectations and classifying the resources for their highest use in terms of experience potential and the resource dependency of these experiences; (7) determining means of reducing conflicts between users with opposing recreation-related demands and appraising the interpersonal-congestion dimensions of area carrying capacity; and (8) evaluating the effectiveness of different visitor management methods such as incentive systems and education.

BUT BEHAVIORAL INFORMATION IS NOT ENOUGH

Despite the importance of behavioral data, it should be emphasized that behavioral information is only one of at least five types of knowledge bases that must be considered by outdoor recreation resource planners and managers (Knopf et al. 1973, Driver 1972). To help iterate this point, it might be useful to group the different types of knowledge bases into five topical sets identified as: Resource-Location, Historical Use, Economic, Administrative-Political, and Behavioral.

Although the five types of knowledge bases are not mutually exclusive, each one does define a rather specific type of information. Also, each group reflects a rather distinct approach to recreation planning and management because each type of information also defines the types of problems for which that information is most relevant. Each will be described briefly:

Resource Location:

Information on the setting and suitability of the physical resources has strongly influenced the kinds and levels of recreation opportunities developed. That information has been obtained from: inventorying, classifying and zoning; appraising the resources within the context of their larger settings; identifying locational relationships, especially distances to centers of population; specifying hazards; and otherwise appraising the recreation resources in terms of their relative scarcity, uniqueness, ecological carrying capacity, and other measures of appropriateness for providing specific recreation opportunities. This type of information defines a supply oriented approach that has been criticized as over-emphasizing supply considerations and slighting demand factors. This might result in creating many similar recreation opportunities on a given resource base within a single region (Twiss 1974). Despite that possible deficiency, this type of information is necessary. However, it can be integrated better with the other four types in recreation planning and management. For example, we might be able to inventory the resources a little better in terms of their potential for providing opportunities for specific recreation experiences or in terms of the resource dependency of specific experiences.

Historical Use:

Descriptive statistical information on past use is relied upon heavily in what could be called the past and current participation approach. Here statistics on past trends of participation "tell" the planner and manager what to do.

The information obtained from this approach has been quite useful in recreation planning. Its five major deficiencies are: (1) it assumes that high levels of participation indicate "successful" planning; (2) it equates past participation with demand and assumes that future demand will follow some historical trend, and thereby, it tends to be self-reinforcing by perpetuating into the future those opportunities which have been supplied in the past, and does not consider latent demand or demand not revealed in past participation (Knetsch 1974); (3) it provides little to no information on substitutibility between activities; (4) it defines recreation as an activity, not as an experience, and therefore offers little insight into the social utility of the opportunities provided; and (5) it nurtures a rather static concept of recre-

ation demand within which explicit questions are not raised about relationships between that demand and changing social conditions, such as energy "crises."

Economic:

In economic terms, recreation resources are viewed as (scarce) economic goods for which there are individual and collective willingnesses to pay. This approach urges particularly for the use of more market-like signals, especially prices, in the allocation of recreation resources. To the extent that the market is unable to do this, the approach calls for the systematic application of principles of public finance in the allocation process. It is concerned with problems relating to the appropriate role of government in bearing the costs of providing recreation opportunities, the efficient level of investment in recreation resource development, and the need for better methods of determining the trade-offs between alternative uses. The data required focus particularly on questions concerning: the benefits and costs of providing different facilities in different locations; the scale of development; the social time preferences for different types of recreation opportunities, and how the opportunities should be financed. The growing relative scarcity of our recreation resources has caused this approach to receive the increased attention it should (Clawson and Knetsch 1966). Some economists, however, fail to recognize sufficiently; (1) several of the deficiencies in their assumptions, such as those regarding existing distributions of income or wealth; (2) the need to sample sub-populations and not rely too strongly on aggregative data; (3) the insufficiencies of the market mechanism; and (4) that other than economic variables must also enter the recreation allocation calculus.

Administrative-Political:

A prudent recreation resource manager certainly must have a reasonable understanding of the administrative-political processes of a democracy. As a general statement, it can be said that the administrative-political approach is one in which primary reliance is placed on the democratic-political process to allocate recreation resources. Under this approach special interests, such as wilderness groups, vie in the political arena for the use of scarce resources according to their preferences. In that arena decisions are made about the rights of future generations of users, the equity of the distribution of opportunities and of tax burdens. Also, the "appropriate" roles of the private and the public sectors are at least discussed if not determined.

Information on recreation resource management is obtained in a variety of ways within this approach. These activities include observing voter behaviors, obtaining information through public involvement and hearings, and analyzing the consequences of interest groups' reliance on the judicial processes. Given the social context within which recreation allocation decisions are made, the practice of pluralism is vital even though it is always accompanied by the potential for the abuse of power, or an inappropriate distribution of such. The information obtained in the other four approaches generally must be processed within the guidelines set by the administrative-political approach.

Behavioral:

Within a behavioral perspective, recreation allocation decisions are not influenced primarily by the inherent capability of physical settings for specific activities, by past trends in use, by the economic characteristics of the resources and its users, or by the administrative-political process. In addition, recreation is viewed as an experience (Driver and Brown 1975).[7/] This approach addresses: the reasons why a person participates; what is done while participating; what is derived personally from participation; and the positive and negative influence of environmental factors (including management decisions) on the recreationist's experiences and behavior. Under this approach, recreation demand is for the opportunity to engage in activities from which desired consequences (i.e., satisfying experiences) are expected. Therefore, the demand is for experiences as well as for opportunities. In addition to experiences, the ultimate social services provided by the opportunities are human benefits. The remainder of this paper describes this approach in considerable detail, and it should become apparent that much additional information on recreation behavior is needed. Despite these gaps in knowledge, behavioral information can be integrated better than it has been with the other four knowledge components of management just outlined (Wagar 1964, Burch 1965, Hendee 1971, Brown et al. 1973, Driver and Tocher 1974).

Integration:

The major point of the foregoing discussion is that different problems facing recreation managers require different amounts of each of the five types of knowledge. Another important point is that information from all five knowledge bases needs to be integrated to the extent it is relevant. Thereby, we will help avoid a disciplinary approach to recreation problem solving, which has occurred too frequently, and put more emphasis on an interdisciplinary or multidisciplinary approach.

Certainly, it is no easy task to integrate the relevant knowledge from all five information bases. To do so, recreation planners and managers must have a high degree of technical expertise and work with an interdisciplinary team of technically proficient experts each of whom must have the ability to communicate to other members of the team and to compromise. Also, the task of integration is always formidable because each relevant knowledge base defines sub-problems of the larger whole, and a holistic approach is difficult to achieve and maintain because the recreation system being evaluated is always a part of a larger system. Data are never equally or sufficiently available

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[7/] Some confusion has existed in the past by use of the words "Behavioral Approach." A disclaimer might help. A strict "behavioristic," or stimulus-response, approach is not being advocated or taken. Instead, the intent is to focus more attention on the social-behavioral aspects of user demand, on-site engagement, satisfaction and benefit. Explicitly, recreation is defined as a particular type of human experience that finds its source in intrinsically (or self) rewarding voluntary engagements (mental or physical) during non-obligated time. These experiences result from participating in an activity, so that participation (or observable behavior) is instrumental (or is a "tool") for realizing the experiences--the desires for which prompted the behavior in the first place. For an elaboration see Driver and Tocher, 1974.

on any of the parts. These problems of achieving integrated planning and management are not unique to recreation, and exist in every field of environmental planning.

In sum, behavioral information is only one type that needs to be considered by planners and managers. The following section explains some of the characteristics of that type of information, especially that dealing with recreation experiences and benefits.

CONCEPTUALIZATION OF RECREATION EXPERIENCES AND BENEFITS[8/]

In this section a simple and integrated model of recreation behavior is described to help structure thinking about the relation between recreationists, their aspirations, the opportunities provided and the social-benefits of these recreation services. The model described is a general one of human behavior in which many different perspectives within the social-behavioral sciences can fit. Heavy reliance is placed on the idea that man is a complex information processing and problem solving organism because that orientation makes explicit (1) the goal-directed nature, or purposefulness, of recreation behavior and (2) the need to look beyond on-site activity in evaluations of recreation demand and behavior.

Many authors have proposed directly or indirectly that most human behavior is problem solving behavior (Marshall 1890, Luce and Raiffa 1957, Festinger 1958, White 1959, Miller, Galanter and Pribram 1960, Howand and Scott 1965). In this approach a problem is not defined as a negative-adversive state but simply as a gap between an existing (or perceived probable) state and one that is more preferred. Therefore, any life situation may be defined as a problem posed to an individual according to this "relative preference" criterion. A person would have a "problem" if he were in a state of bliss and preferred more bliss; he is experiencing a gap. The problem is solved as the gap is closed.[9/]

By definition then, recreation behavior is engaged in to help people solve problems (or reach preferred states) which they find better solved in recreational pursuits or they cannot solve in their non-recreational times or environments.[10/] Identifying those particular preferred states which people desire

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[8/] This section draws heavily on a recent paper that was written on the social-psychological determinants of recreation demand (Driver and Brown 1975). The conceptual model presented is described in considerably more detail in that paper.

[9/] Some problem states do not "mobilize" problem solving behavior because they are relatively unimportant and are maintained rather than solved. Others cannot be solved because of constraints, including the constraint imposed by not knowing clearly what the problem is.

[10/] An earlier paper (Knopf et al. 1973) defined recreation behavior as a means of helping the users realize their "unmet needs" that could not, or for some reason, were not met in non-recreational times or spaces. The view offered here is the same if one accepts the idea that needs are defined as preferences under the philosophical suggestion that humans have no needs, only strong preferences, such as to stay alive.

to realize while recreating is one way of defining the types and relative importance of the experiences desired (or demanded) from recreation opportunities and at least inferentially of identifying the social-individual benefits gained. To illustrate, assume that a potential recreationist is experiencing a problem which causes him to desire a specific type of gratification during leisure time. The recreationist's problem, within the constraints that govern his behavior, is one of finding a recreational opportunity which will provide that gratifying experience.

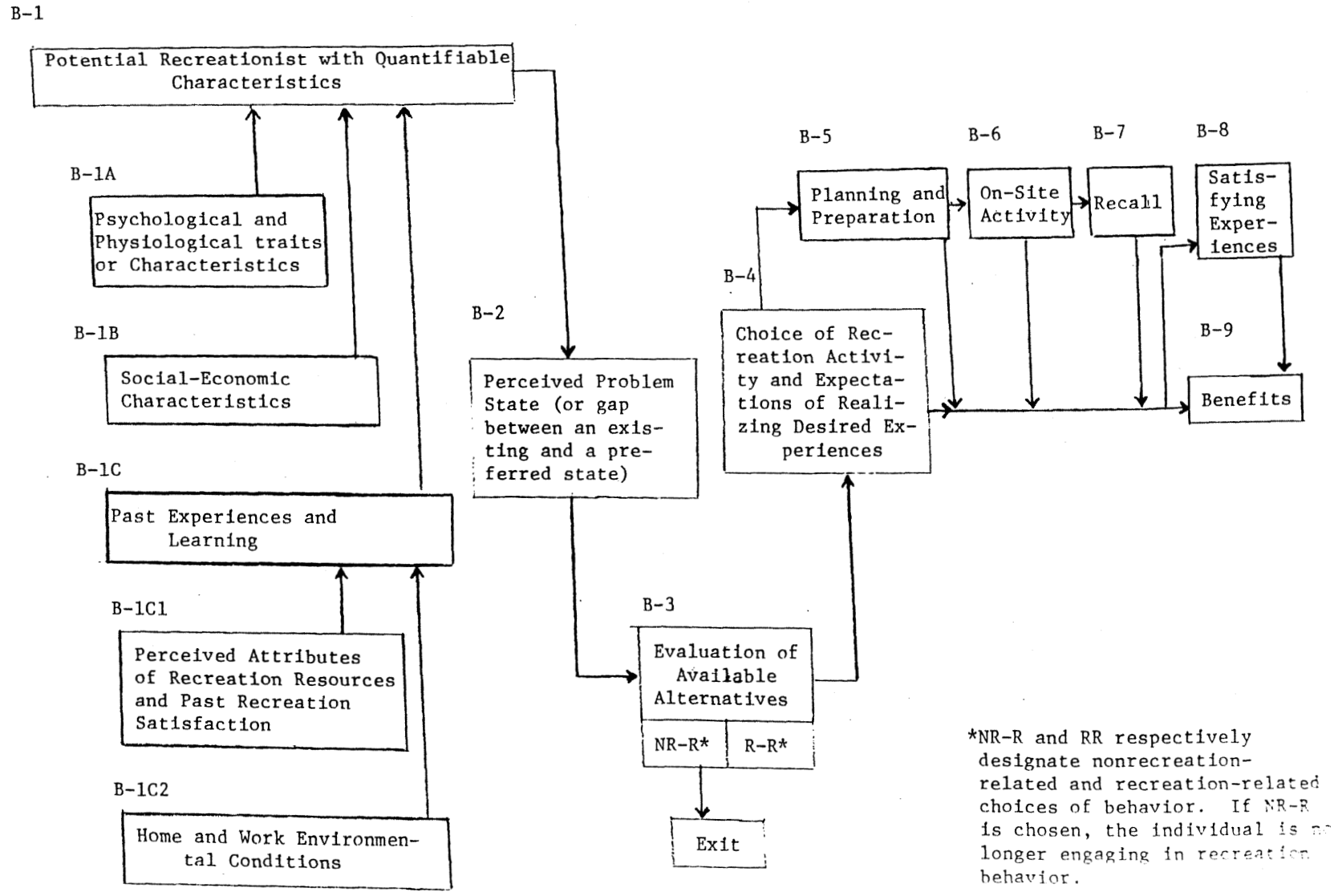
Using this "conceptual framework," certain questions about recreation-related desires, experiences, and benefits become more explicit. Do the problem states that prompt a choice of wilderness camping differ from those that prompt using state parks? If so, how and why? Or, how do the recreation-related problem states of low-income residents of inner cities differ from those of affluent suburbanites, and are these problems really being solved through present recreational engagements or should they be? Specifically, are the available recreation opportunities being used primarily as a means of temporarily escaping problems that reappear when the recreationist goes back home? If so, are we dealing more with symptoms than causes? Also, how can managers as problem solvers better help the recreationist solve his recreation-related "problems?" The model illustrated in Figure 1 can help guide investigations directed toward questions such as these.

Basically, Figure 1 attempts to illustrate simply how the factors influencing or defining recreation behavior can be grouped into quantifiable sets. The nature of the model should become clearer as a hypothetical recreationist is walked through it rather quickly. The many feedback loops and the dynamic, ongoing effect of current environmental influences are omitted for purposes of simplicity.

The model proposes that a potential recreationist (B-1) has several quantifiable characteristics (such as B-1A to B-1C) each of which can help cause a particular problem state and its associated preferences to become dominant (B-2) at a particular time. To satisfy these preferences (i.e., resolve the problem), the individual considers his options (constraints and possibilities) and their expected-probable consequences (B-3). Through this decision process, he decides at some level (psychological or physiological) to (1) commit his subsequent behavior to recreational activity, or (2) engage in some other type of behavior (i.e., exit the recreation behavioral sequence)[11]. If subsequent behavior is committed to recreational activity, the individual

[11] Alternately, it can be explained that the recreationist is appraising the expected utility to him of various available options in an attempt to realize a satisfactory (and not necessarily optimal) solution to his problem to the extent he is aware of the problem. That "awareness" might not be very conscious and could even be physiological and still prompt the behavior indicated. Space does not permit an elaboration of this decision-making process. It should be pointed out though that no claim is being made for a perfectly rational "economic man" who always acts in his best interest. All that is being suggested is that the decision is a purposeful one, whether or not the desired consequences are really in the best interest of the recreationist.

Figure 1: Quantifiable sets of variables within a sequential model of recreation behavior



has purposefully chosen a specific recreation activity or environment[12], and this choice is accompanied by expectations of realizing desired consequences (or satisfying experiences) which are viewed as attainable (B-4). Further commitments of behavior are made to planning (B-5), traveling to the site or facility, on-site engagement (B-6, which could be a mental "site" and engagement only, say in fantasy), traveling home, and recall (B-7). From each of these behaviors (B-5 to B-7), the recreationist can realize satisfying experiences (B-8) and personal benefits (B-9)[13]. The benefits can be gained without conscious awareness, such as better muscle tone from walking an interpreted nature trail to learn.

To summarize, Figure 1 simplifies recreation behavior in an attempt to chart sequences of behavior so we can identify specific sets of variables and decision points. The model is founded in the assumption that recreation behavior is not random but instead has causes and direction even though: (1) the recreationist need not be consciously aware of these causes and preferences; (2) the behavior can be exploratory or trial and error (heuristic) as well as habitual or engrained in learning from similar past recreation experiences, and (3) the recreationist need not attempt to maximize his expected returns as would the classical economic man. Within the model, recreation satisfaction or pleasure is a feeling that finds its source in a variety of specific recreation experiences, some of which will be more satisfying than others. Furthermore, the model incorporates the idea that recreation activities are selected to realize a variety of experiences simultaneously, but that specific activities are selected by particular recreationists, within the bounds of their constraints, to realize those experiences that are of highest relative importance at any particular time. Therefore, explicit to the model is the idea that an activity will attract users who expect satisfying experiences that are relatively unique to that activity.[14] For example, the more satisfying aspects (experiences) of hunting differ from those associated with visiting an historic ruin . The challenge is to define which types of experiences are expected by which types of users, which activities best provide opportunities for specific types of experiences and which benefits are realized

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[12] Although purposeful, the decision might be an exploratory one involving heuristic (trial and error or searching behavior) rather than more habitual-predictable behavior. Also, the decision might be quite spontaneous, or spur of the moment, although most outdoor recreation decisions would appear to involve more planning.

[13] A recent publication by the US Office of Management and Budget (Executive Office of the President, 1973) suggests that social planning should be evaluated by criteria (or social indicators) that "measure end products of, rather than inputs into, social systems." Boxes 8 and 9 of Figure 1 specify the end products of recreation "systems."

[14] Opportunities to realize these specific satisfying experiences are dependent on specific attributes of the resources, the facilities, the equipment, the users' peers and other users engaging in a particular activity. These attributes serve to facilitate (scenic mountains, big fish, few people) or to constrain (polluted streams, little fish, crowds of people) the realization of those expected and desired consequences (or pleasurable experiences) that give satisfaction. Since various recreationists perceive and value these attributes differently, they will engage in different activities.

from these experiences.[15/]

The model suggests a three-step procedure for identifying and quantifying the personal-social benefits of recreational engagements as follows:

1. First, identify and measure the relative importance of the desired and expected consequences (i.e., expected satisfying experiences) of different types of recreationists (characterized by the various descriptors inherent in B-1A to B-1C of Figure 1) who are engaging in specific recreation activities.

2. Second, assume that the desired and expected consequences of large groups of recreationists (most of whom have participated in similar activities in the past) are reasonably well related to the personal and social benefits "sought." Then form hypotheses about the personal-social benefits derived by clearly defined types of users who rate particular activities high in importance for providing certain types of experiences. For example, it could be hypothesized that a specifically defined user group who places high importance on a certain type of fishing for purposes of "skill development" (an expected desired consequence or desired experience) realize greater self-confidence (a possible mental health benefit).

3. Test the hypotheses under experimental-controlled conditions, including the evaluation of benefits over time.

The question then arises: Can this procedure be followed and give reliable and accurate results? My answer is yes, it can to a very useful degree.

IMPLEMENTING THE PROPOSED APPROACH AND SOME METHODOLOGICAL ISSUES

For the purposes of this paper, it seems inappropriate to go into a detailed dissertation on the research procedures for, and methodological problems of, measuring social benefits. Instead a more general overview will consider these four issues: (1) how well can the expected and desired experiences and benefits be identified and measured; (2) which experiences and benefits are worth measuring; (3) what are the possible effects of researcher biases; and (4) which alternative methodologies are most suitable or appropriate?

How Well Can the Expected Experiences and Benefits Be Measured?:

Early work by Lewin (1951) and recent work in motivation psychology (McClelland et al. 1953, Birch and Veroff 1966, Atkinson and Birch 1972), and works of other social psychologists (Jones et al. 1972) indicate that we do most things for a reason and these reasons are influenced by our personalities, our values (and those of our associates), and the resources (or options) available to us, including information and our perceptions of our

15/ Activities providing similar "packages" of experiences and which are equivalent in costs (dollar, time, etc.) are probably substitutes for each other.

skills and abilities. In the language of a motivation psychologist, the relative strength of a particular "behavioral tendency" and the "motivational determinants" of that tendency can be identified and measured. The current work of Fishbein and Ajzen (1974 and 1975) suggests that specific intended or planned behaviors are closely related to subsequent actual behaviors to the extent that specific consequences of the intended behaviors are known, expected, and valued. Put more simply, subjective appraisals (attitudes, opinions, expectations, etc.) and actual behaviors are in relatively close agreement when these subjective appraisals are realistic with respect to the specific consequences that are most likely to result from specific behaviors. Much poorer relationships exist when there is little knowledge on probable consequences and when the possible consequences are of little importance. This theory is relevant to recreation then if the probable consequences of a specific recreation activity are known, expected, and valued by recreationists who intend to engage in that activity.

Most recreation opportunities are not used by recreationists who are participating for the first time, so these users have knowledge of the consequences from past participation. And many first-time participants have heard of the likely consequences from friends. Therefore, most of the people for whom public and private sector recreation demand and benefit analyses are most relevant probably have reasonably accurate ideas about the likely consequences of their recreation choices.[16/] These expected consequences are obviously valued as desirable, else the activity would not have been chosen. And if interviewing is done on-site, intended behaviors are manifested by the actual participation. The problem then becomes one of measuring the expected and desired consequences.

I believe the most pervasive and managerially relevant expectations can be measured reasonably accurately for any large group of users with similar characteristics (such as day users picnicking at a particular site during a particular time who are similar in age, income, size of home city, past picnicking experience, etc.) The desired and expected consequences of recreationists not having the benefit of past experience (i.e., not having the same predictability of probable consequences) can be measured less well. Also, the postulated close relationship between expected and actual experiences cannot be assumed as readily for this group even though information on likely consequences is frequently passed from a past to a potential participant. It is more difficult, therefore, to measure the latent or unrevealed demands of non-users. Figure 1 does, however, help define more clearly what the concept of latent demand is.[17/]

16/ This is not to say that all expectations are met. It would seem, however, that most expectations of users that stay in the "market" are met.

17/ The reader should be leary of results that question non-users of their expectations. It might be instructive though to infer what the demands of clearly defined types of non-users are by comparing them with users having characteristics similar to the non-users. Or useful baseline data might be obtained from research designs which appraise the degree of match between "latent" expectations and actual experiences of control groups of non-users who are provided a "real" opportunity as part of the research design.

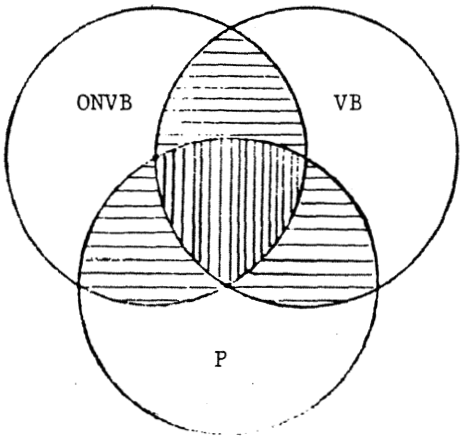
In sum, I believe the pervasive expected and desired consequences of clearly defined types of user groups can be quantified to a useful degree given the state of the art of applying behavioral science to recreation management. The following section gives an overview of the different approaches for making these measurements.

Which Research Approach Should Be Used?:

It was stated above that the demand for most types of recreation opportunities is by people who have relatively good knowledge (much of it is experiential) about the types of satisfying experiences realized from engaging in specific activities. Methodologically, the major problem is one of bringing this information to a level of consciousness or awareness at which it can be evaluated systematically so that reasonable inferences and hypotheses can be made about the personal-social benefits associated with these experiences.

At this point, many social-behavioral scientists "part company," and others look on with skepticism, because of different philosophies about the degree to which the expected and desired experiences and benefits can be identified and measured reliably and validly. It is my contention that through the application of different techniques as checks one on the other, user expectations, experiences and benefits can be identified and measured reasonably well (Kerlinger 1964, and Nunnally 1967).[18]

To elaborate, the techniques of measuring human behavior can be grouped into three categories which also define three types of behavior. These are expressed in Venn diagrams in Figure 2. The crosshatched areas represent those behavioral responses that are common across two or all three of the alternative types of measurement. These overlapping responses are probably more reliable and accurate indicators of "real" behavior than are responses that do not cross-check. For example, verbal responses might be distorted because a person being researched might be afraid to give a truthful answer, might say something that he thinks the researcher wants to hear, or might wish to bias the research results in a way favorable to his interests.



Legend

VB = Verbal Behavior
ONVB = Overt Nonverbal Behavior
P = Physiological Response

Figure 2: Three types of Human Behavior-Responses.

Questionnaires can be used to measure verbal responses (such as pencil and paper psychological tests of whether a person is an introvert or an extrovert). Unobtrusive methods can be used to examine overt nonverbal behavior (such as observing whether or not the person actually behaves as if he is an extrovert or an introvert). And mechanical-electrical instruments can be used to measure physiological response (such as determining arousal levels and causes, which seem to predict tendencies toward introversion or extroversion under specific conditions).

It is hazardous to rely on only one approach. The trick is to get cross-checking methodologies to converge (or overlap in Figure 2) in support of a particular hypothesis about a specific expected consequence, actual experience or benefit (Campbell and Fiske 1970). For example, it seems possible to measure benefits of a tranquil natural environment (feelings of reduced tension, lower observed levels of interpersonal aggressiveness; and lower blood pressure, pulse rate, etc.) using all three approaches as cross checks. Also, different procedures (such as those using physiological measures) should be used within any one approach (or circle in Figure 2) as cross checks.

In sum, human behavior is complex, but techniques do exist for measuring recreation-related expectations, experiences and benefits.[19]

Deciding Which Expectations Are Worth Measuring:

It is known that humans have a wide variety of motivations and experiences (Murray 1938, Laing 1967). There is also a wide variety of recreation-related experiences. The problem is one of deciding which expected and desired experiences should be "pursued" in research concerned with identifying and measuring the social benefits associated with these experiences.

Researchers and managers must work together to resolve this problem. Also, further identification and classification of user expectations must be accomplished before decisions can be made regarding which consequences are most managerially relevant. Criteria will need to be established to guide this decision. Some possible guidelines are offered to illustrate the type of thinking required:

1. The expected and desired consequences or experiences should be managerially relevant or something that managers can influence either directly or indirectly. Alternatively, this criterion can be stated in terms of which types of experiences different types of managers can influence the most.
2. The expected consequences should be desired by a significant number of users (both actual and potential) and not be common to only a

[18] If nothing else, and I believe there will be considerably more, we will have enhanced our judgments in the process. Sometimes, asking the right question puts us considerably over halfway toward finding a satisfactory or better answer even with knowledge constraints. Also, it seems apparent that there are never ultimate and final truths (only partial and temporary answers that change as the social and other contexts change) in any field of inquiry.

[19] For purposes of simplicity, the words expectations and desires are being used synonymously in this paper although technical arguments (which get complex) can be made that the two differ.

small percentage of the (on-site or off-site appreciative) users of a particular opportunity.

3. The expectations should relate to the administrative jurisdiction or statutory responsibilities of the public agency providing the opportunities if publicly provided.

4. Related to No. 3 above, the expectations should to some reasonable degree be related to or dependent on the resources under the jurisdiction of the supplying agency.

5. The desired experiences should be socially acceptable to a reasonable degree if the opportunities are being provided primarily by public funds.

In sum, the process of deciding what expected consequences or desired experiences and benefits should be researched is one that requires judgment. But as cited below, past outdoor recreation research indicates that certain types of desired experiences are pervasive in importance and are managerially relevant. These include: developing skills; competing or achieving; learning; being creative; exploring; being with friends, the family or like-minded associates; experiencing nature; exercising; taking risks; seeking thrills or stimulation of various types; manipulating machines; seeking privacy-solitude; reflecting-introspecting; and coping with a wide variety of adversive stimuli experienced in home, neighborhood, and work environments.

Problems of Research Bias:

In deciding which desired experiences to research, an ever present methodological question is: How is it known with assurance that the experiences and benefits identified and measured are those most important to the recreationists and not those of importance to the researcher?

Most existing research on recreation behavior reflects strongly the personalities and other personal inclinations of the researchers. This is not necessarily bad, so long as these influences do not also guide the data beyond the limits of the research designs in which they were collected. The likely deficiency is that not enough personal inclinations of recreation researchers are available to represent those of the public! In any event the researcher must be aware of the possibility of mapping his or her values onto those of the people studied. He also should be aware of the different procedures that can be used to cross-check the results of one approach with those from another, and he must work closely with managers.

STATE OF THE ART OF THE DESCRIBED APPROACH

Considerable descriptive research has been directed at determining relationships between recreation participation and socio-economic variables (B-1B, in Figure 1), such as income and occupation. However, most of the behaviorally oriented outdoor recreation research has been attitudinal in nature and has relied on questionnaires designed to solicit subjective responses to conditions specified by the researcher. A few studies have been reported using direct observation techniques to measure overt non-verbal behavior.

Most of the behavioral research has also been applied or strongly managerially oriented rather than basic or developmental. As such, it has not contributed greatly toward the development of a body of knowledge (Driver and Knopf 1975a). Despite these problems, results from past recreation research support the approach proposed in this paper for identifying and measuring benefits. A few representatives of these empirical studies, which are directly relevant to the behavioral scheme offered in Figure 1, will be mentioned.

Empirical research directed specifically at the antecedents of recreation choice and activity support the idea of problem solving during recreation behavior as proposed in this paper. Examples include reports by Catton (1969), Burch (1969), Ferris (1970), Meyersohn (1970), Witt and Bishop (1970), Knopp (1972), Mandell and Marans (1972), Morris et al. (1972), Sofranko and Nolan (1972), Davis (1973), Grubb (1975), Kelly (1974), LaPage and Ragain (1974), Driver and Knopf (1975b), and Foss (1975).

Other studies focusing on specific types of problems indicate a strong influence of home, neighborhood, and work environments on choice of recreation activity, reasons for that choice and amount of participation. For example, Grubb (1975) found relationships between auto workers' perceptions of job boredom, choice of activity, types of experiences sought, and days of participation in those activities which were viewed as more stimulating that the workers' jobs. Several studies (Mandell and Marans 1972, LaPage and Ragain 1974, Driver and Knopf 1975b) found that the relative importance of various types of desired and expected experiences differ for users characterized by different socio-economic variables such as age, sex, income, city size, stage in family-life cycle, perceived quality of home and work environments and other variables. Bassett et al. (1972) found that users of Michigan's AuSable River who differed in their expected consequences also differed in their perceptions of the severity of the conflicts between canoeists and trout fishermen. These differences were especially pronounced between the users who did, and those who did not, desire to see and be with other people on the river.

Knopf (1972) did a rather comprehensive review of the research, through 1971, addressed to relationships between recreation activity and changes in personal-individual traits such as self-esteem, dominance, etc. He also reviewed thoroughly the research literature dealing with the motivational bases of outdoor recreation choice and with the users' perceptions of satisfaction received. The research reviewed and reported since 1971 (e.g., Knopf et al. 1973, More 1973, Potter et al. 1973, Hendee 1974, Peterson 1974a, 1974b, Brown and Hautaluoma 1975, and Orthner 1975) indicate pervasive themes about expected consequences or experiences sought. Some example results from research with which I have been associated will be presented for illustrative purposes.

Tables 1 and 2 show some of the expected consequences sought by the different test groups of recreationists indicated. Sample sizes are small because the purpose of the research was to develop instruments to measure the consequences by using test groups of users rather than to apply the instruments to representative samples of users. The methodology is explained in detail elsewhere (Knopf 1972). Briefly, the procedure consists of asking recreationists to check in a questionnaire how important each of a long list of reasons (i.e., expected consequences) were to them when they decided to engage in the activity

TABLE 1.--Mean scores of 10 different test groups of Michigan recreationists to selected expected consequences scales.[a/]

Expected consequences	Trail biking	Pic-nick-ing	Social camp-ing	Back country camping	Back country hiking	Trout fish-ing	Warm water fish.	Sail boat-ing	Tennis	Golf
Achievement	5.7	3.0	4.4	3.9	4.9	4.7	4.6	5.7	6.7	5.5
Avoid others' expectations	5.4	5.5	6.0	5.6	5.0	4.9	5.7	4.4	4.3	4.3
Being with others	6.2	5.9	7.0	4.6	5.2	4.0	5.4	5.4	5.7	5.5
Dominance-control	4.1	2.2	3.0	2.7	3.5	2.5	3.1	3.5	3.5	3.4
Exercise-phys. fitness	4.1	4.1	4.5	3.8	5.6	3.6	3.5	4.2	7.3	4.9
Experience nature	5.8	7.0	7.5	7.8	7.6	7.3	6.8	6.2	2.7	5.0
Exploration	6.1	5.2	6.2	5.7	6.7	5.0	5.8	5.7	3.5	3.7
Family togetherness	4.4	5.9	7.4	5.7	4.6	4.0	5.3	4.4	3.5	4.1
General escape	5.9	6.5	6.6	6.4	5.6	6.2	6.0	5.6	4.3	4.7
Mental change	5.4	6.3	6.4	5.4	5.4	5.7	6.0	5.2	5.1	5.2
Social recognition	3.5	2.2	3.2	2.5	3.4	3.3	2.3	3.2	3.6	3.3
Tension release	5.0	5.4	5.4	4.1	4.2	3.9	4.8	4.6	5.8	4.9
Risk-taking	4.3	2.3	2.9	2.4	3.4	2.6	2.9	3.5	2.3	2.9
Sample size	51	56	52	49	47	25	30	49	51	46

[a/] Responses were to a 9-point scale format on which Extremely Important was coded 9 and Not At All Important was coded 1.

SOURCE: Knopf 1972, pp 111-113.

Table 2.--Ranking of test groups of Colorado snowmobilers' and cross country skiers' expected consequences.

X-C Skiers' expected consequences ranked by importance (N=71)	Mean score[a]	Snowmobilers' expected consequences ranked by importance (N=22)	Mean score[a]
1. Experience nature	4.9	1. Experience nature	4.3
2. Exercise	4.9	2. Family togetherness	4.0
3. Exploration	3.8	3. Being with friends	3.7
4. Being with friends	3.8	4. Exercise	3.5
5. Change-variety	3.6	5. Change-variety	3.5
6. Achievement	3.3	6. Exploration	3.2
7. Mental disengagement	3.2	7. Being with other people	2.9
8. Tension release	3.0	8. Mental disengagement	2.5
9. Independence-autonomy	2.9	9. Tension release	2.3
10. Being with other people	2.4	10. Achievement	2.2
11. Arousal seeking	2.4	11. Arousal seeking	2.2
12. Family togetherness	2.4	12. Independence-autonomy	2.1
13. Dominance-control	2.3	13. Dominance-control	1.3

[a] Responses were to a 6-point scale format on which Extremely Important was coded 6 and Not At All Important was coded 1.

in which they were participating when interviewed.[20] These reasons were grouped into "Expected Consequences Scales" (shown in the tables) by statistically combining similar reasons. For example, "to exercise," "to keep physically fit," "to improve my physical health" and other similar expected consequences were combined into an Exercise-Physical Fitness Scale. By computing mean responses for each scale, the average importance given to the expected and desired consequences making up that scale could be determined for each recreationist, and thereby an overall mean response could be computed for each type of activity.

Table 1 shows how 10 different test groups of Michigan recreationists varied in the importance they assigned each of 13 different types of expected consequences when they were deciding to engage in the activities shown. It can be noticed that exercising and achievement (skill development) were of the most importance to the 51 tennis players interviewed. Experiencing nature was least important to that group of users but was quite important to the test groups of back country campers and hikers. Other comparisons, such as the

[20] Responses could range from Extremely Important to Not At All Important.

trail bikers' desire to take risks, will be left to the reader. The table does indicate that any one activity provides a variety of (and not just one type of) satisfying experiences and also that some of these experiences are more important or satisfying than others for a particular activity.

Table 2 shows similar results for test groups of Colorado snowmobilers and cross-country skiers. That table ranks the relative importance of the expected consequences for both types of user. It is interesting to notice the similarities and differences in their preferences or expectations.

Tables 1 and 2 are examples of the types of results obtainable from the proposed approach. Some of the other studies showing similar findings were referenced above. All of these results help confirm the propositions (1) that specific types of activities are engaged in to realize the satisfying experiences that are relatively unique to that activity, and (2) that many of the experiences are highly dependent on the values inherent in specific resources required for a particular activity. These resources include game animals, tranquil settings, group accommodations, and cultural-historic restorations.

Admittedly, human behavior is complex and the problems of uncontrolled or intervening variables pose difficult problems for research. Nevertheless, progress is being made in structuring behavioral problems in managerial terms and in getting managerially useful results. Much more certainly needs to be done so that the actual and potential users' preferences, actual experiences and benefits can be identified to help assure that recreation resources are allocated to their highest purposes.

NEEDS FOR FUTURE RESEARCH AND SOME PROBLEMS OF IMPLEMENTING THE RESULTS

Since this paper has been a call for more research on the social benefits of outdoor recreation, few additional comments will be made on research needs. To iterate, however: research is needed to define and quantify the expected and desired consequences or experiences sought and the short-term and long-term benefits gained by different types of users who participate in specific types of outdoor recreation activities; the relationships between these benefits and conditions experienced back home need to be investigated more thoroughly; and research designs should employ techniques using subjective-verbal, unobtrusive-observational, and physiological measures.

The need for this type of behavioral research have been recognized in several national evaluations. One of the four chapters in the 1969 National Academy of Sciences' evaluation of outdoor recreation research was addressed to these needs and was entitled "The Social and Behavioral Dimensions of Outdoor Recreation" (NAS, 1969). The 43 managers and researchers at the September 1974 National Outdoor Recreation Research Needs Workshop ranked "Social and Behavioral" studies as an area of high research priority (BOR, 1975). Similarly, the recent publication by the National Academy of Sciences entitled "Assessing the Demand for Outdoor Recreation" called for more behavioral information in recreation demand analyses (NAS, 1975). The point is that the need for this type of information is recognized nationally. However, resources necessary to conduct adequately this type of research need yet to be mobilized. These resources include not only monetary support but also the support and

endorsement of recreation agency administrators. Even if these resources were mobilized, however, the results would not be easy to implement or apply for several reasons.

Although a growing number of managers realize the need for a better understanding of recreation behavior, some of them experience understandable difficulty in relating to that body of knowledge and its applications to management for several reasons. First, many recreation resource planners and managers are not familiar or comfortable with the social-behavioral sciences because most of their training has been in the natural-physical sciences. In fact, many professionals trained in the natural-physical sciences view the social sciences with a certain degree of suspect, part of which is justified. Second, a behavioral interpretation of recreation broadens considerably the scope of many managerial problems, makes explicit certain questions that do not have clearcut answers, and/or the answers are frustrating because they suggest solutions that are not under the discretion-jurisdiction of the manager. Third, human behavior is complex, and behavioral information requires acquiring a new vocabulary or at least gaining an understanding of new concepts and research approaches. Fourth, many of the managerial applications indicated by the research (such as off-site education of users and concern about latent demands) require unusual time and other resources of managers who are operating under everyday constraints and pressures of an immediate nature.

Although there are difficulties, I am optimistic that recreation managers and researchers will be working more closely together in the future to accomplish our mutual objectives. All indications point in that direction.

SUMMARY

This paper has proposed that much additional research on the personal-social benefits of participation in outdoor recreation is needed to take us beyond our current intuitive understandings of these benefits. A model was presented to help show the linkages between user expectations, experiences and benefits. Within that model, the outputs or products of recreation management systems were defined not only as opportunities but also as human experiences and benefits the latter two are the real goods and services produced.

The basic premise on which the conceptual framework of the paper rested was that the most pervasive and managerially relevant satisfying experiences and personal benefits realized from recreation behavior can be identified and measured to a managerially useful degree.

One must acknowledge seriously that there are risks involved of over-rationalizing the field of recreation behavior in attempts to identify users' expectations, experiences and benefits. The subject might be so complex that these variables are, in fact, not measurable, and that we are deluding ourselves to propose otherwise. We must be careful not to "use the users," misrepresent them, or adopt research and management strategies that do not account for all relevant preferences. Real options for choice must be preserved or created to the extent feasible,and the user's self-respect must be protected. To do that, the user must be kept aware that his preferences are being evaluated, and the purposes for doing so must be explained. Also, as a "cross-check" on the researchers and managers, users should be involved in the allocation decision process. Thereby, the use of behavioral information

in planning and management decisions can be reviewed by the publics for whom these decisions are made.

Despite these risks of implementing the proposed approach, the risks of not doing so are equally great and might be quite costly socially. The field is too important socially to continue to rely primarily on intuition to guide most of our recreation management and policy decisions. In the face of increased relative scarcity of our natural resources and with the growing problems associated with urbanization, better measures are needed of what should be produced, for whom, by whom, where, when and at what price. But it will take time and the strong support of managers and administrators.

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A CRITIQUE OF THE PAPER ENTITLED "IDENTIFYING SOCIAL BENEFITS OF OUTDOOR RECREATION"

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The paper addresses a complex area--identification of personal-social benefits of outdoor recreation participation--to help understand recreation behavior. The relevance of this topic and its interweaving with a whole gamut of other recreation concerns, such as substitutability, is increasingly being recognized by recreation planners and managers.

The need to measure the attractants of various recreation opportunities is further emphasized by the recent upsurge in interest in new types of recreation and activities involving more of a challenge or degree of danger.

This paper points up the need for additional work, and certainly has merit as a beginning towards more applicable research. However, this critique is supposed to address usability from a manager's perspective. The following questions and comments are offered as those that might be raised by a manager.

Application would be greatly influenced by the constraints already imposed on managers--such as budget, existing policy, physical design of a facility, environmental restrictions, and operation and maintenance obligations. Thus, early consultation with managers should be sought in determining what recreation experiences are relevant for their use.

Use of this research in allocating recreation resources would probably be more applicable at the planning level. Usability by "managers" in this respect would be contingent upon the extent of the "manager's" authority relevant to resource allocation. However, use by managers with programmatic responsibilities would be more applicable.

Variables, or "environmental influences" as the author refers to, are many and apt to change, thereby influencing the recreationist's interest and/or gratification. Perceived benefits in the recreationist's mind may change due to the "environmental influences" and thus vary at time of interview, time of activity and when he anticipates or repeats that same activity. The author refers to this as "extinction of benefits."

Can motivation and benefits perceived by individuals at one point in time be collectively compiled and analyzed to produce findings and recommendations applicable to masses of recreationists for a projected length of time?

Driver has considered this and stated that managers and researchers must not think "truth" has been reached--the answers are only temporary and partial. If so, it is questionable that long-range planning and management decisions can be influenced by the research reviewed in this paper.

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PUBLIC INVOLVEMENT IN RECREATION RESOURCES DECISION MAKING

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Abstract.--In response to legal and administrative requirements, federal natural resource agencies are involving citizens in the decision making process. However, given the arguments stated both for and against public involvement, one might raise a question about the proper role of involvement in agency decision making. While twelve general principles of public involvement and a number of relatively new public involvement techniques, e.g., public information brochure, nominal group and Delphi, are discussed, research has not progressed to the point where "formulas" for involvement can be given. Agency cooperation is vitally needed to permit a comparative evaluation of alternative techniques.

Additional keywords: Citizen participation, public relations, public preferences, public administration, recreation planning, water resources planning, forest land planning.

INTRODUCTION

In recent years, public participation (citizen involvement) has become institutionalized in much of natural resource agency decision making. While one might question the validity of agency involvement in what is often considered the "political arena," it is in effect required. For example, the National Environmental Policy Act of 1969 (NEPA) and Executive Order 11514 mandates public involvement with respect to major actions. In addition to these requirements, agencies have also been subjected to court challenges, protests, and other activities by organized groups demanding either different decisions or inclusion in the decision making process.

To avoid conflict, to implement legislative and executive directives, and to act on recommendations of the Public Land Law Review Commission (1970) and the Conservation Foundation (1972), federal agencies such as the Forest Service, Park Service, Bureau of Land Management, and Corps of Engineers are seeking to develop improved procedures for involving citizens in the agency decision making process. Efforts to develop public involvement procedures are also occurring in various state, county, and multicounty planning jurisdictions in relation to land use planning; however, whether these procedures are being developed as a consequence of legal requirements or administrative

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initiative is not clear. Passage of a national land use policy act will ultimately require the development of public involvement procedures to establish land uses within and between all governmental jurisdictions.

There are differences of opinion about the meaning of the term, "public involvement." For this paper, public involvement will be defined as any activity which brings the viewpoints of organized citizen groups or individual expressions into an agency for consideration.

There are basically two sets of activities which may generate public involvement: (1) concerted action by citizens which results in developing communications with an agency, e.g., citizen opposition to a proposed highway through a park; and (2) agency-initiated public involvement as a result of legislative mandates, agency sensitivity to the importance of an issue, or agency commitments to programs. In this paper we will discuss the latter form, that is, agency-generated public involvement programs.

There is a wide range of potential forms of public involvement in planning and decision making. At one end of the continuum is an organizational-expert system where plans and policies are formulated by using a rational decision making process (Bultena and Rogers 1973). Non-agency persons are minimally involved in this case.

At the other end is a democratic-participatory system in which the public is involved directly and continuously throughout the entire planning process rather than at the end after all plans and policies have been determined. Between "the expert" and "the participatory" system are various systems where public views are sought at various stages, and where the degree of public involvement ranges from occasional consultation to no consultation at all. For a description of various systems see Davis et al. (1975) and Bishop (1970).

For those agencies that use "the expert" system, the presumed advantage is employment of professional ethics and standards which are "value free" with respect to programs and a rational decision making process in which goals are clearly defined, pertinent data collected, the range of alternatives and their consequences specified, and the most efficient alternatives selected. However, it is recognized that, in fact: (1) these goals are often unclear, (2) the data collected is never the sole criterion used to make decisions, and (3) choices are restricted to alternatives that are known, available, and consistent with the agency's mission.

Use of "the participatory" system by agencies, on the other hand, is based on the recognition that agency decisions are considerably influenced by social and political forces from within and outside the agency. Policy is influenced by the exercise of pressure by interest groups upon agency officials and elected representatives. Decision making is seen as a very complex process which is sporadic and involves bargaining between agency officials and the public (Wengert 1955, Holden 1966, Hagevik 1970).

While NEPA requires public involvement on all major federal actions and Executive Order 11514 requires agencies to develop procedures to assure understanding of proposed actions and to solicit public views, these mandates lack sufficient specificity. For agencies with these mandates and any other agency attempting to develop public involvement procedures, there are a number of very difficult questions which must be answered. Who is "the public"? How should they be involved? On what issues should they be involved? At what point in the decision making process? For what length of time during agency decision making? One could go on and on raising questions but the most troublesome would still be how can it be done effectively, since no criterion of effectiveness exists with regard to public involvement.

PROS AND CONS

Arguments For Public Involvement

As we see it, there are four major arguments for public involvement in decision making.

1. Public involvement has recently been promoted for ethical reasons. The argument is that citizens have an inalienable right to be involved in the formulation and implementation of agency programs. These ethical considerations relate to the fact that those who are to be affected by a policy, or who are to pay for it have a right to be consulted (Sewell 1974, Morley 1974, Folkman 1973).

2. Public involvement is needed to make management decisions which reflect the wishes and needs of the citizenry. Management decisions involve both policy and technical aspects. The policy aspect concerns what ought to be, and therefore, involves a consideration of social values--which benefits are most important and what level of costs are acceptable to the public. The technical aspect concerns the possibilities for and the consequences of following alternative courses of action in achieving objectives.

Ultimately citizens must guide or at least consent to management decisions. Managers and planners should, therefore, attempt to use information on public preferences as well as technical expertise in making decisions (Wagar and Folkman 1974, Davis and Bentley 1967, Bultena et al. 1973, O'Riordan 1971a). Since many studies have demonstrated managers or planners do not know the preferences of citizens, it is particularly important that managers seek this information (e.g., Hendee and Harris 1970, Bultena and Hendee 1972).

In many cases planners and managers erroneously assume that they are aware of the social costs and benefits of a decision. Input from people to be affected by the decision would enable better estimates of social costs and benefits.

3. Public involvement would provide information on aesthetic and other environmental values that have not generally been included in benefit-cost analysis. At best, such analyses only provide an estimate of the least (rather than the most) which people would be willing to pay to maintain environmental quality (O'Riordan 1971a). For example, using public opinion polling, as a public involvement technique, researchers reached different conclusions about the benefits and costs of proposed reservoir development projects than were reached by benefit-cost analysis (Bultena and Rogers 1974).

4. Public involvement will often identify a greater range of management alternatives and obtain a wider basis of support for the implementation of management decisions. With this expanded range of alternatives, completely unacceptable choices will likely be omitted before they are implemented. In addition, by involving those persons likely to be affected with those that affect plans, it may be possible to anticipate unforeseen consequences.

If people are involved in the decision making process, they will have a better understanding of the meaning of a decision for them and thus are more likely to support the implementation of the decision. To be successful, a decision must not only be beneficial and feasible, but also acceptable to a majority of the population that is affected (Wilkinson 1974). For individuals who provide input into the decision making process, personal satisfaction and morale is increased as a result of being included in the process. It also contributes to responsible behavior (Smith 1973).

Arguments Against Public Involvement

There have been a number of major arguments raised against public involvement (Wilkinson 1974 and Bultena and Rogers 1973).

1. It encourages mobilization of antagonistic interests. It has been the experience of agencies, in some cases, that proposed programs were defeated after the agency aroused the public about an issue. Furthermore, public involvement has the potential for opening a political Pandora's Box (Wengert 1974).

2. It is costly in terms of time and money and may serve to slow down efficient decision making. Agency administrators cannot afford the time and costs of obtaining public involvement on many official actions.

3. Citizens lobby for local interests or special privileges. Lobbying can prevent the initiation of projects that have more widespread benefits. Wengert (1974:119) notes that: "Participation becomes a mockery when local objectors are permitted to frustrate decisions that affect a regional or national interest. This is not to say that local objectors should not be heard, but the sad fact is that the procedures do not prevail for recording the interest of any others."

4. In general, citizens are not involved in the decision making process. Those who are active may not be representative of the public as a whole. Many citizens remain silent because of their lack of concern, interest, knowledge, motivation or time. Any program of citizen involvement should include this "silent majority" (Wengert 1974). Though the majority may be silent, this may not mean indifference. Silence may be as much a function of political alienation and limited information as it may be to the holding of mild preferences (O'Riordan 1971b).

5. Many resource problems involve complex technical issues which may be beyond the competence of the citizen to understand.

6. Various forms of public input are difficult to weigh in making a decision. Because of the lack of clear direction from the legislative branch of government, many agencies have difficulty weighing the various forms of public input. Any scheme of public involvement, according to Wengert (1974: 124), "must face the issue of weighing the views and opinions, distinguishing between preferences and public interest."

7. Public involvement in an agency cannot avoid the dilemma of cooperation and manipulation of public support by disseminating selective or tainted information, winning support by favors, and otherwise influencing outcomes (Wengert 1974:125). Previous studies have found that agencies will, initially, only disseminate information that will show the benefits of the project with little or no information on the costs (e.g., Stamm and Bowes 1972).

8. The results of some forms of public involvement are unpredictable. The point has not been reached where one can choose a technique and be certain that it will work in all situations (Davis et al. 1975).

SOME GENERAL PRINCIPLES

There are a number of general principles that should be kept in mind when an agency is contemplating public involvement.

1. Involve the public on those issues that appear to have important consequences for society. The decision making costs of information dissemination and collection are too high to have public involvement on a large number of issues. Some decisions must be based on the manager's experience or "hunches." While there are costs for the agency, there are also costs to the citizen. It is generally known that only a limited number of persons can or will take an active part in matters that affect them. The costs of acquiring the information necessary for active involvement and the costs of negotiation are too high (Buchanan and Tullock 1962, Downs 1957). Individuals often lack sufficient interest in many of the problems to organize and select representatives to aid in decision making (Olson 1965).

Decisions to seek public involvement should be based on a sensitivity to public interests. There are a number of criteria that can be considered in making a decision about whether to seek public involvement. Among these are: (1) number of persons likely to be affected by the decision, (2) geographic size of the area to be affected, (3) value of the resource (economic, aesthetic), (4) expenditures required to implement the decision, (5) anticipated public interest in the decision, and (6) legislative mandates.

2. Decide the referent of the term "public." It is critical that the agency decide whether the program is to be aimed at the general citizenry, a segment or segments thereof, or some combination of these. This, in effect, determines the nature of the involvement effort.

3. Define the objectives of public involvement and develop performance criteria. A number of studies have indicated the importance of specifying objectives and developing performance measures (Copp 1973, Hendee et al. 1973, Middaugh 1973). More progress is apparent in the former than the latter. An outstanding example which one might cite in performance measurement is that of the Ontario Provincial Government (1974), which has developed a set of criteria for measuring program performance.

4. The objectives and procedures of involvement should be communicated to the public. It is important that the agency clearly spell out how the public involvement "game" will be played. For example, an agency should indicate who has the responsibility for the final decision and the various factors that will be taken into account in making the final decision. It should also indicate that the objective is to reach agreement on the decisions and that reaching agreement will require some bargaining by both sides. It is important to build a sense of trust and confidence so that participants will want to "play" again. Specification of the rules of the "game" should effectively minimize polarization of values and preferences.

5. Public involvement must be sought before a decision has been reached. There is general agreement in the literature that people have been involved too late in the decision making process (e.g., Hendee et al. 1973, Wilkinson 1974, Copp 1973). It has typically been the case that people have been asked to react to decisions that have already been made by an agency. There is no sense in going through the motions of asking for a response when the agency has "made up its mind"; moreover, there is no quicker way to alienate the public than to ask for comments after a decision has been made (U. S. Forest Service 1974). Earlier involvement will be more likely to establish trust and confidence in the agency.

Ideally an agency would involve the people in assessing the problem, suggesting alternative actions, assisting in describing impacts, and finally, expressing preferences on alternative actions (Ortolano 1974). While the ideal calls for involving people at all stages in the decision making process, the decision about the stages of involvement would have to be evaluated in terms of the benefits and costs to the agency and to the participants.

The "fishbowl" planning process developed by the U. S. Corps of Engineers to incorporate public involvement avoids the problem definition stage, and gives early emphasis on identifying alternatives and evaluating the consequences of these alternatives in terms of achieving desired objectives (Sargent 1972). For small group interactions, the problem formulation and plan evaluation stages are believed to be the most critical points for public involvement (Delbecq and Van de Ven 1971).

6. Seek to involve the full range of publics affected by the issue. Both proponents and opponents of agency policies should be invited to express their views. To accomplish such a goal is difficult because some groups are not willing and capable of organizing and expressing their views.

The question of interest representation is a vitally important consideration in any public involvement undertaking. Recent research indicates that participation by interest groups, while not representative in terms of socio-economic characteristics, have the same opinions on environmental issues as the general public. However, the major difference is that interest group participants are more willing to take action (Wilkinson 1974). Certainly, further research is needed to substantiate these results in a variety of situations.

With respect to interest representation on a geographic basis, local interests often dominate public input (Stankey et al. 1975). Thus, special efforts may be necessary to secure input from regional and national interests, when the issue is judged to have impact at those levels.

7. Select the appropriate approaches to obtaining public involvement at various stages in the decision making process. For example, opinion polling appears useful at an early stage to learn public awareness of the problem while workshops and conferences would be valuable after tentative consideration has been given to issues and alternatives.

8. Seek to sustain a high level of involvement but not necessarily continuous involvement of the same individuals. It is difficult to maintain the interest and commitment of everyone throughout the decision making process. People generally have many competing claims on their time (Sewell 1974).

9. Communicate information to affected publics with fidelity so that citizens may become cognizant of the consequences of various solutions. Public involvement must be preceded by a great effort to inform and educate the citizenry. In this regard, a person must: (1) receive accurate and unbiased information from the agency regarding the problems and issues, (2) know the consequences of the alternative solutions, and (3) be able to accurately express his preferences for the alternatives and the values he associates with them.

It is particularly important that an agency clearly define the issues to avoid being accused of misrepresentation of intent by those outside the agency. Also, as Haefele (1973:180) has stated, "how an issue is framed determines not only which people are for it and which against. . .but also the intensities of feeling pro or con." In addition, an agency should seek a clarification of public preferences through education rather than "selling" a single viewpoint (Swan 1974). This need to clearly define issues and to clarify public preferences in public involvement suggests a new and important role for information and education personnel in relation to agency decision making (Cutler 1974).

10. Allow adequate time for the public to respond to the issue as a means to assuring accurate and complete input. It has been observed that it takes time before the full implications of a decision become apparent. In many cases, unfortunately, it is only after implementation of the decision that people realize the consequences of it.

11. Request the assistance of social scientists in the collection and analysis of public preferences. Assessment of public preferences is a complex task and requires the skill of persons familiar with social science methods and concepts. See Hendee et al. (1974) for an excellent framework for incorporating public involvement into agency decision making.

12. While public preferences are a vital consideration in agency decision making, constraints such as legal mandates, ecological issues, resource capability, economic problems, etc. must also be considered in the decision. Public involvement requires the weighing of public preferences, among other factors, to arrive at a management decision. Some writers say that it also requires the granting of actual influence over the content of decisions to groups affected by those decisions, which implies that being cognizant of the preferences is insufficient. It must include the preferences "in the decision itself" (Irland and Vincent 1974). Considering the variety of preferences expressed by various individuals and interest groups, it may be impossible to accommodate all these views in the decision. This is particularly the case, for example, for the management policies dealing with the administration of the Wilderness Act of 1964 where both preservation and limited human use are explicit objectives of the Act. Although preferences may be expressed for providing for more intensive recreational uses, these preferences cannot be accommodated because of legal mandates (Stankey 1972a). These preferences may, however, indicate that there is an unfulfilled societal need and efforts should be made to accommodate this need either by amending the Act or by other actions.

In summary, effective public involvement requires that the manager: (1) know the preferences of individuals and groups affected by a decision, (2) consider these preferences and other factors in making a decision, (3) know who gains and who loses by particular decisions, and (4) communicate the rationale for a decision to affected publics.

APPROACHES

There are a variety of techniques that have traditionally been used for obtaining public involvement. They range from those receiving input on a massive scale (e.g., public meetings, hearings, soliciting written input) to small groups (e.g., workshops, ad hoc committees, advisory groups) to individuals (e.g., key contacts).

There is general agreement in the literature that there is not a single best technique for obtaining public input. Each technique has its advantages and disadvantages, which have been described by Hendee et al. (1973), Bultena and Rogers (1973) and U. S. Forest Service (1974). Collection techniques can be evaluated in terms of a number of criteria, for example: (1) how well are the interests represented; (2) how useful are the techniques in terms of the goals sought; (3) what range, specification, and intensity of preferences and values are communicated; (4) are personal preferences and values clarified; (5) how effective is the technique in reducing group conflict and achieving a satisfactory solution; and (6) does it produce results commensurate with the effort.

Different techniques for obtaining public input are more effective at some stages than at others. For example, interviewing "key" persons early in the planning process seems to be effective in identifying goals and objectives. Public hearings, on the other hand, are useful for obtaining reaction to alternatives, but tend toward an adversary process and generally do not lead to mutual understanding or consensus.

Evidence seems to indicate that some techniques are more frequently used than others. A recent study by Hendee et al. (1973) showed that public meetings, key contacts, agency reports, and mass media were the most frequently used approaches to public involvement. Similar results were obtained by Davis et al. (1975) who found that public hearings, advisory boards, and mass media were the most frequently used techniques.

Opinion polling is only infrequently used by natural resource agencies as a public involvement technique (Bultena and Rogers 1973, 1974). This limited use occurs despite the fact that opinion polls, when conducted by in-depth interviews, have a number of advantages over commonly used techniques. For example, they : (1) place the problem in context and permit the individual to reveal preferences not only among those items mentioned by the interviewer but for others as well; (2) remove certain biases inherent in some techniques, e.g., public hearings usually express the views of only a few individuals and reveal primarily what people do not want rather than what they would prefer; (3) reveal the preferences of the "silent majority," which might not be recorded; and (4) indicate the extent to which the nature of a problem is incorrectly perceived (Sewell 1971).

Considering the limited number of techniques now believed to be used by agencies, there seems to be a need to develop and use a variety of new techniques for obtaining public input (Wagner and Ortolano 1975).

A relatively new mass-oriented technique developed by the Seattle District of the U. S. Corps of Engineers is a public information brochure for communicating information to the public and receiving a response. The responses provide a basis for a revised brochure, which is distributed and subsequent iterations occur. A brochure typically contains: (1) background of past studies, (2) a summary of the alternatives with the pros and cons of each alternative, (3) a matrix displaying the consequences of each alternative for each public objective, (4) a listing of contributors, and (5) a glossary of technical concepts. Individuals can respond to the brochure by adding a pro or con to the list, and rebuttal space is provided across from each pro or con. This brochure is utilized as a latter part of the "fish-bowl" planning process (Sargent 1972).

In addition to the Seattle District brochure, the Inland Lakes Project research group used a brochure with "mail response forms" to obtain such citizen input as seriousness of problems, individual actions to alleviate problems, and willingness to take action. As a response to the "mail response forms," two brochures were prepared and disseminated to the community. One of these brochures discussed ecological concepts and the other discussed problems and guidelines for community action (Fulton 1971).

Brochures appear useful at all stages of the planning process. They are useful for disseminating information, educating publics, and obtaining reactions to information presented.

Additional new techniques reflect input from small group research. The Delphi technique, for example, involves the use of questionnaires, which are developed by staff and completed individually by a panel. Participants in the Delphi technique are physically dispersed and do not meet face-to-face for group problem-solving activities. The purpose of the technique is to elicit the values of the participants and discover the basis of differences in values. It also is useful in ranking alternative actions.

The nominal group technique, like the Delphi technique, is particularly useful for obtaining the views from people of diverse backgrounds and perspectives. The procedure for the nominal group technique is as follows: (1) individual members first silently and independently generate their ideas on a problem in writing, (2) each individual presents one of his ideas to the group without discussion, (3) these ideas are summarized in a terse phrase and written on the blackboard or sheet of paper on the wall, (4) ideas are discussed for purposes of clarification and evaluation, and (5) ideas are silently voted upon by individuals using a ranking or rating procedure. The "group decision" is the pooled outcome of the individual votes.

The nominal group technique appears to be equally effective as the Delphi method in terms of the quantity of ideas generated and the perceived satisfaction of participants. The conventional interacting or discussion group appears less effective than either the nominal group or Delphi techniques (Van de Ven and Delbecq 1974).

The nominal group technique was used by the National Park Service to obtain regional goals and priorities for a thirteen county area in North Carolina and Tennessee surrounding the Great Smoky Mountains National Park (Brodie and Falk 1973). The Bureau of Land Management is using it as a training device for field personnel. It has also been tested elsewhere as a citizen involvement technique (Dane County Regional Planning Commission 1971, Institute for Environmental Studies 1975).

Once public input has been obtained, techniques to code, analyze, store and retrieve input are used. The U. S. Forest Service has developed a system called CODINVOLVE for this purpose and the system has been used in relation to many roadless area reviews and environmental statements (Clark et al. 1974, Clark and Stankey, in press). Content analysis is a technique which might be recommended for analyzing content of letters and other printed material. It has been used, for example, by Stankey (1972b), Middaugh (1973), and Erickson (1973).

RESEARCH NEEDS AND APPLICATION

Research Needs

Much of the public involvement research to date has not been a comparative evaluation of alternative approaches, but rather a description of case studies such as the Susquehanna Communication-Participation study (Borton and Warner 1974). Lacking comparative evaluations, it is difficult to prescribe any "formulas" for public involvement. Cooperation of agency administrators is vitally needed to permit experimentation with various approaches. The research on the nominal group and Delphi approaches being conducted by Van de Ven and Delbecq (1974) is an excellent example of the kind of experimental research desired.

Needed research to guide the development of public involvement activities has been described in detail by Stankey et al. (1975). Some of the more important research needs are outlined below:

1. Amount of Public Involvement. Empirically founded criteria need to be developed to guide decisions on "when" and "how much" input is needed.

2. Techniques of Collecting and Analyzing Public Input. What alternative collection techniques are possible and what are the benefits and costs of these techniques? What are the advantages and disadvantages of these techniques at each stage in the decision making process? How does the quality of opinion vary with collection technique? What techniques can be used to analyze information?

3. Participant Characteristics and Motivation. What kinds of people are participating in resource decisions? Does involvement reduce anomie and powerlessness? Why and how do people get involved? What techniques are effective at obtaining representation of all interests affected by a decision?

4. Group Interactive Mechanisms. What are the costs and benefits of various interactive mechanisms between managers and the public? What mechanisms are most effective for exchanging information between managers and the public? What mechanisms tend to reduce conflict?

5. Information Dissemination Techniques. What techniques can be used to communicate issues to the public? How does the definition of the issue affect the kinds of participants that become interested in the issue? What techniques are effective at displaying the consequences of alternative courses of action?

6. Decision Making Procedures of Resource Agencies. To what extent are state and local agencies utilizing public involvement procedures in decision making? What techniques are being utilized?

Barriers to Application of Research Results

There are a number of barriers that are likely to affect the future implementation of research.

1. The attitudes of professionals toward the value of public input in decision making. Professionals often believe they know what is best for the public--and in some cases they are probably right. But to go blindly along without full knowledge of the various interests and the benefits and losses generated by decisions seems insufficient for acceptable public administration.

2. The costs in terms of money and time. For example, preparation of information and education materials and programs is expensive. To permit sufficient time for effective involvement may be too time consuming for an agency. In many instances, the pressures to make a quick decision do not permit use of effective public involvement techniques and the public has to be involved too late in the process. Direct involvement techniques such as workshops are costly for the participant as well, and the agency will have to expend considerable efforts to assure sufficient involvement.

3. Many managers lack the interest and the skills required for public involvement (Stankey et al. 1975). Many managers have chosen the resource management profession because they like to be away from citizens, not interact with them. Thus agencies should consider training sessions for defining various roles in the decision making process and training for effectiveness of public involvement (Folkman 1973). Experience with the actual process itself is beneficial too. As Hendee et al. (1973) have indicated, "experience with public involvement tends to reinforce a commitment to it."

4. The uncertainty of the results of public involvement. Some interest groups are likely taking advantage of involvement and are utilizing it to gain power and influence. Also, public involvement gives no assurances that an interest group will still not subsequently challenge decisions in court.

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A CRITIQUE OF THE PAPER ENTITLED

"PUBLIC INVOLVEMENT IN RECREATION RESOURCES DECISION MAKING"

Owen T. Jamison 1/

The authors have done a creditable job in describing the state of the art in public involvement. They have asked the right questions and brought out the shortcomings, problems, and research needs. My principal regret about this paper, and hence the state of the art, is that there is not more new research and techniques to report. Most of the "relatively new" public involvement techniques have been in use by the agencies for some time. This strongly points up the need for much more effort in this vital arena.

With an awakened (or aroused) and interested public we all know that public involvement must be much more than running a project or program by selected keymen. It is, however, relatively new to most natural resource agencies. There is much to be learned and we well know that the process will be hard.

The Forest Service has had considerable experience in public involvement. Major recent efforts in national programs such as Roadless Area Review and Evaluation (RARE), Environmental Program for the Future (EPFF), and Forest and Rangeland Renewable Resource Planning Act (RPA), plus inumerable regional and local programs, have shown us that the authors' cited problems are very real and not overstated.

Time and money are critical problems. I disagree with the authors that agency administrators cannot afford the time and cost of public involvement on many official actions. This assumes significant actions, of course. We cannot afford not to afford the time and cost. Generally, court tests are more time and money consuming than public involvement.

I do not, however, downplay the time and cost factor. Our evolving experience in RPA bears this out. It takes much time and money to prepare and disseminate 150 tons of public information in 2½-inch sets. Of course this just starts the process. Public meetings, analysis of public input, revisions, final documents, etc., add to the load.

While not disagreeing with the authors on research needs, here are my ideas on priorities:

1. What should be presented to the public and how? Most environmental statements are too lengthy and technical for even other technical people to assimilate.

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2. How can we gather input from the vast public who are involved in the decision but usually not represented? How can we be sure everyone is being heard?

3. How can we better interpret what we receive? This question does not belittle the work that has been done in this area. It just shows my perception of its importance.

4. How can we better cross-pollinate between agencies for a more effective, understandable and uniform approach to the public?

5. How do we keep research focused on the problems as perceived by managers?

6. How do we establish clearer communications with secondary fields?

7. Can we (and how) keep public involvement on a cost-effective basis?

NEW ROLES FOR GOVERNMENT AND INDUSTRY IN OUTDOOR RECREATION

W. F. LaPage[1/]

Abstract.--The examination of some possible future options for public parks and recreation agencies is necessitated by 3 hard facts: 1. the rising dominance of the private sector, 2. the emerging public revolt against increased tax supported programs, and 3. the trend toward greater public involvement in agency decision-making. A central role for public parks and recreation agencies is seen to be that of a cooperator with the private sector, taking such forms as joint development planning, increased use of concession-operated public facilities, and new directions for public parks and recreation programs.

"Everyone wants the government to be bold and imaginative and infallible -- all at the same time. It will never happen"

John W. Gardner, in "No Easy Victories"

The recent evolution of outdoor recreation in America could be described from several different vantage points: greater public demands for more and more recreational services, the increasing dependence upon expensive equipment and highly developed facilities, the expanding role of parks and recreation professionals, and the proliferation of public agency plans, programs, and purchases of land. But perhaps the most dramatic adjustment has been the shift in the relative "market shares" served by public recreation agencies and private enterprise. From a position of near obscurity little more than a generation ago, private enterprise today outnumbers and outperforms the public sector in the provision of several kinds of outdoor recreation services.

This changing cultural view of outdoor recreation, from that of a purely social good to the image of profit making "commodity", carries with it a number of potential identity crises for public outdoor recreation agencies. Now, as this private enterprise trend converges with other social trends of wide-spread public resistance to further expansion of tax-supported programs, and increased public involvement in agency decision-making, an examination of new roles for public recreation agencies is timely if not imperative.

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Coordinator - Cooperator

Dominant among these "new" agency roles is that of a coordinator and cooperator with the private sector. This is a role which is widely recognized as a legitimate one among recreation and parks professionals. But it is also a role which is seldom funded or explicitly described in the agency's legislative mandate. Consequently it is a role which receives a lot of attention as "policy" but has few operational guidelines in practice.

Effective coordination and cooperation requires rapid and reliable systems for (1) determining what is going on outside of the agency and (2) arriving at a consensus among agency clientele on appropriate responses. Such systems do not exist and I know of no serious efforts to develop them. For example, the majority of State Park agencies determine the need for new campsites by the presence of overcrowding at their own campgrounds. With very few exceptions, States do not survey the private sector prior to expanding their own capacities (Fuller, 1969).

Surveys of the private sector should not, however, be restricted to determinations of capacity and attendance. Types of facilities offered, fees charged, development plans, and public assistance needs, are items of information for any public agency which is serious about its coordinating and cooperating role. The possible elimination of public agency programs is as valid a goal as expansion, for the public administrator who is concerned about moving some of his budget and manpower away from duplicative activities and into new and innovative programs.

The development of information systems which will provide a basis for changing organizational direction should include the criterion of a minimal reporting burden on private enterprise. On-the-ground agency personnel frequently have a good idea of what nearby commercial developments are charging and what kinds of facilities they offer. Standardized observation techniques can increase the utility of such data. Observational data on nearby situations can be supplemented through a variety of sources such as State-wide comprehensive outdoor recreation plans, trade association brochures and bulletins, Chambers of Commerce, and an open-door agency policy. As local businessmen discover that their views are welcomed, and are in fact a source of public policy influence, a more desirable public-private recreation complex is certain to emerge. The agency's responsibility to the public is not served by ignoring or competing with one segment of that public.

Effective cooperation with the private sector will require expanded agency capabilities for promoting, conducting, purchasing, and interpreting recreation market research. Whether a public agency wishes to cooperate with the private sector or not, its need to improve its understanding of research will increasingly be felt as the numbers of recreation researchers and their printed output expands its influence in the profession. A further motivation for an improved research capability is the growing social insistence upon research-based impact assessments of all contemplated actions, including economic impacts. And, finally, as park agencies expand into presently under-developed areas, such as cultural programs and events, they will need some advance assessment of the market and subsequent analysis of program success (Ritchie and LaBreque, 1975).

The combination of agency willingness to change its policies, its practices, and its programs, plus the solid backing of the private sector will seldom be sufficient to produce organizational change. The approval of existing clientele groups, legislators, and budget directors is no less essential. Involving these publics and seeking a concensus from them will increasingly become a major agency effort rather than an occasional top-level activity.

Innovator - Experimentor

As private enterprise increases its capability to provide outdoor recreation services, both on its own land and through public land concessions, public agencies can begin to fill some of the immense gaps in the existing spectrum of recreation opportunities. Lloyd and Fischer (1972) have prescribed a program of providing better balance in the total array of outdoor recreation opportunities as the best way to alleviate current overcrowding at both ends of the concentrated-dispersed continuum. The middle ground between outdoor resorts and wilderness areas is a gold mine of opportunities for public recreation administrators to experiment with. It also represents the vast majority of public lands available for recreation to the person of average means.

Improved opportunities for cross-country skiing, bike trails, vehicle trails, and a wide variety of interpretive trails are some of the more common examples of needed recreation opportunities which can be legitimately supplied by public agencies. Such opportunities are seldom financially attractive to the private developer, but their public provision will tend to enhance the attraction and viability of near-by complimentary private exterprise. Dispersed picnicking sites, back-country tenting, "micro-wilderness" experiences, and aerial tramways to remote scenic spots (Julber, 1972), are further examples of mid-range developments. The Ozark Folk Center, developed by the Arkansas Department of Parks, is an outstanding experiment in preserving and encouraging the musical and crafts heritage of a region.

In addition to experimenting with new recreation services, public agencies need to experiment with new clientele groups. Most State Park agencies, for example, are well staffed with specialists in design, planning, construction, management, and promotion of outdoor recreation areas. These people could provide badly needed extension-type services to private recreation developers and to communities. The possibilities of direct competition with private consultants can be minimized by the types and intensities of services provided.

The past successes of public agencies in developing new recreation markets, and expanding them to the stage where they have commercial investment potential, provide models which should be easy to replicate. Today's immense downhill skiing market, and the now highly diversified camping market are results of early and successful public park innovations. Many other recreation markets can trace their evolution to similar beginnings. The problem is, as Peter Drucker (1973) describes it, that no success lasts forever. "A success which has outlived its usefulness may, in the end be more damaging than failure." It's time for many public park agencies to ask themselves if their tax-supported ski areas and campgrounds may have outlived their usefulness; and whether their manpower and resources might be better used to create new successes and stimulate whole new cycles of private investment.

Innovations in services must be matched with innovations in management. With a few exceptions, our public parks and recreation agencies have not developed reputations as management innovators. I almost hesitate to raise the subject of concession operations before a group of public park administrators. Their predictable negative reaction is usually based on heresay rather than personal experience; and badly out of date heresay at that! The subject of concessions on federally owned areas has been studied and restudied numerous times by Congress and the agencies. Past failures were due as much to a lack of agency support as to concessionaire incompetence. The private sector today has the expertise to manage public outdoor recreation services. And, I hope that public parks administrators have grown commensurate in their abilities to supervise performance contracts, and experiment with the concession concept.

The number and types of concessions on national and state recreation lands appears to have remained fairly constant in recent years (U.S. House of Rep., 1974). And, while several recent reports such as the Conservation Foundation's "National Parks for the Future" (1972) have recommended that concessions be phased out, the report of the Public Land Law Review Commission (1970) makes several recommendations to strengthen and expand concession operations on state and federal lands, including agency capital development, reduced fees and longer terms.

Of the nearly 1,800 concessions on Forest Service lands, 80 percent are either low investment low return type operations (back country packers) or high investment high risk types such as resorts and winter sports areas. Operations such as stores, swimming facilities, picnic sites, and camping areas account for less than 10 percent of all concession operations and far less than 10 percent of the available opportunities. Conversely, concessions on state recreation lands are almost exclusively the high volume type of activities such as eating places, stores, water activities, and overnight accommodations (U.S. House of Rep., 1974). The recurring observation that concession operations on federal lands are marginal investments at best may be totally a function of needlessly restrictive public policy.

As recently as 1968, in a National symposium on outdoor recreation planning, the view was expressed that: "The country has made the determination that it is in the public interest to provide outdoor recreation opportunities with public money. The task is to provide a basic outdoor recreation system within the reach of every citizen. There is an important role for private initiative but it is not a dominant role." The role of the private sector in recreation must be similar to its role in other areas where government provides the basics, like education for example" (Diamond, 1970). Any assessment of today's private enterprise role which arrived at a similar conclusion would have to be made in complete ignorance of such operations as the campground franchisor who provides more campsites than the entire National Park system. And, this is just one of 4 dozen franchise organizations in the camping field. Furthermore, if it is, in fact, our national goal to provide a basic outdoor recreation system which is within the reach of every citizen, it would be naive to assume that this could be accomplished without the private sector playing a major role.

Innovations in management need not be spectacular. Better systems of cost-accounting are needed so that more informed public decisions can be made. In a great many park systems today, it is virtually impossible to obtain any estimate (reliable or not) on the cost of providing such services as an overnight camping experience. Without this kind of factual information it is almost absurd to consider a change to concession operation, or to solicit public involvement on decisions of whether to expand or even continue agency campground operations. Accountability may prove to be one of the major public policy issues for our parks and recreation agencies in the years ahead through pressures from the private sector and citizen interest groups.

Advocate - Promoter

None of the roles that I have described - innovator, experimentor, stimulator, coordinator, cooperator - are really new for public recreation agencies; although they may need a little dusting off from time to time. However, none of these roles, or their potential accomplishments, can become a reality unless parks and recreation professionals are willing to revitalize their basic role and become activists for their cause. In recent years, the activist role in environmental-conservation concerns has slipped away from the professionals and now resides in citizen groups and in the courts.

The growth of public participation is vividly described as a paradox for the public administrator by Harlan Cleveland's succinct statement "How do you get everybody in on the act and still get some action?" (Cleveland, 1974). The era of participation is clearly an improvement over the days when nobody seemed to care what was done with public lands. But, just as clearly, if some of our past leaders had discussed their great ideas widely before launching them, most would probably have collapsed with dry rot awaiting a consensus that they would float.

Public participation can be viewed as a new leadership opportunity - developing real participatory roles and new styles of involvement. Or, it can degenerate into an endless series of plebescites in which "procedure becomes the surrogate for substance" in what Victor Thompson (Thompson, 1965) would call a "bureautic" or "bureaupathic" response. There is some evidence that citizen involvement is already being viewed as a convenient shield for avoiding the responsibility of making hard decisions by some of our private sector cooperators (LaPage, 1975).

The idea of being branded a "zealot" today is unattractive for most professionals. "Advocate" is the more acceptable term. If you look at the early leaders of most of our conservation and parks agencies, they were more than advocates! In fact, Anthony Downs (1967) hypothesizes that all bureaus are initially dominated by advocates or zealots. But, he also suggests a "Law of increasing conservatism" that all organizations become more conservative and more resistant to change as they grow older. Since most of our parks and recreation agencies are old organizations with long established routines it would be easy to be pessimistic about the possibilities for major innovations.

Breaking the Law of Increasing Conservatism requires both a conscious effort and a clearly established goal. It requires not just being an advocate for change, but being a promoter for some very specific changes. It requires not trying to satisfy everybody (which usually means satisfying nobody) but setting your sights on a specific share of the recreation market which you can most appropriately serve. Parks and recreation agencies more than most service institutions, find it very difficult to set priorities. And, when they do, the priorities may be the reverse of what would normally be good business practice. Programs which fail to produce get increased budgets precisely because of their failure, while the performers are assumed not to need any special attention (Drucker, 1973).

The budget is clearly a primary focus for organizational change. Obviously, nothing is accomplished unless scarce finances and manpower are concentrated where they are needed most. Citizen involvement, performance budgeting, and even suggestions for recreation voucher systems (Sears, 1975), are recognitions of this fact. But, they each run the risk of becoming procedure-bound.

It seems increasingly clear that the future administration of our public parks and recreation areas will take the form of a shared leadership. The professionally trained parks administrator can become the spark plug of a team including professional and citizen advocates, or he can become a technician carrying out the wishes of others and contributing toward a state of "participatory mediocrity". The dynamic leader is not the antithesis of participatory administration; in fact, he may be in demand more than ever.

Public participation is not an administrative tool. It is a style of administration. But, more than that, it is a "natural" for parks and recreation. Volunteer "advocate bureaucrats" could be enlisted to work within agencies in staff positions to help citizens gain access and present their views on critical decisions. Volunteer field workers have a long history of helping to develop trails and public recreation sites. Volunteer office staff would be a logical extension of this valued heritage. There are numerous kinds of advisory committees that park administrators could use to increase participation. But, basically, performance and openness will probably neutralize much of the pressure for "participation".

A Look Ahead

In a recent address before the National Forest Recreation Association, the Chief of the Forest Service said: "The commercial campground franchise is now a recognized and viable part of camping but so far it has been developed on private land rather than public. Has the time come that development of such commercial campgrounds should be invited on the National Forests?" (McGuire, 1973). Certainly the time has come for a thorough experiment with the concept involving a variety of camping market areas, government built campgrounds, and concessionaire built campgrounds. This is exactly the type of experimentation and innovation which is necessary to reduce the burden on the agency of managing thousands of campgrounds with increasing use levels and a decreasing number of real dollars to do the job.

If, in the mid-1970's, we are asking ourselves whether franchise campgrounds may have a place on public lands, perhaps by the end of this decade we will be truly managing outdoor recreation on a sustained yield basis, charging realistic fees, and returning a percentage of the revenue to maintain the resource. And, perhaps by the mid-1980's we will be asking ourselves whether tax dollars are still needed to subsidize an industry that is self-sustaining and an activity that long ago ceased to be dependent upon a natural environment.

The question of the appropriateness of modern "camping"to our public lands is clearly stated in Curt Fuller's analysis of government-private relations in the camping industry:

> "There is the myth of God's Country. There is the myth of therapy for our souls by communing with Nature. And there is the principle that everyone should have free access . . . But when we examine the myth as far as recreational vehicle camping is concerned, it is quite clear that we are dealing with another situation altogether. We are really not talking about raw nature, primitive living, and God's Country. We are talking about sophisticated self-contained camping vehicles, which are increasing at the rate of 350,000 units annually. We are not talking about a tent beside a mountain stream but about a trailer with a gas furnace controlled by a thermostat, hot and cold running water, a gas refrigerator, a gas stove with oven, and three-way lighting. We are talking about a campground with water and electrical hookups and, if not sewers, a powered honeywagon. We are talking about recreational buildings, swimming pools, organized activities, and luxury facilities generally . . . I question whether it is the government's responsibility to provide such luxury facilities at all, and particularly on a subsidized basis" (Fuller, 1969).

In many instances, there is no question that our public recreation lands can be put to a higher use than parking lots for self-contained vehicles and all of the roads and services that they entail. Just as realistically, the attraction of those public lands demands that some accommodations be provided nearby. Again, Fuller suggests that perhaps the government could acquire a buffer zone outside of the park and, through controlled lease arrangements, allow private enterprise to provide the service facilities.

Commercial outdoor recreation was described in the late 1960's as a "potential giant who is just about to enter the first grade" (Horvath, 1970). If that assessment was correct, the "giant" is now about to enter high school and, in four more years will be demanding his rights. The analogy may be a little imprecise, but we are certainly in for some challenging years in the last half of the 1970's trying to harness the public and private teams to at least pull in the same direction.

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A CRITIQUE OF THE PAPER ENTITLED - "NEW ROLES FOR GOVERNMENT AND INDUSTRIES IN OUTDOOR RECREATION"

James D. Haynes[1/]

I received LaPage's paper as promised and made one quick read through. My first thoughts were: "Is the author advocating a policy change for the public parks and recreation agencies or is he only giving food for thought." Without rereading his paper I made three copies and mailed one to three different executive-type guys and requested a brief critique. One went to a Vice President with 30 years experience via Forest Service, lumber companies and paper companies. One went to a forest research analyst with 25 years experience and the other a recreation professional (MA in Recreation) with 15 years experience via state government, real estate, franchise camping, recreation consultant and large corporation. It appears a good many of us get our working life's start with the government. Even I co-oped with TVA during my school years. Without identifying who said what, these are their replies:

1. "The idea that the private sector should provide fee based services is great. Tell him (LaPage) to hang in there. The government can't even run the government."

2. "Sounds like the making of another star-studded B--- S--- seminar on how government can help manage private enterprise.

3. "My reaction is one word - Amen! Such, in my view, provides a proposal for getting the taxpayer out of funding/subsidizing the recreationist. It suggests let the private sector do it and make money out of it if opportunity can be developed and apparently they can, if the author's thesis is valid."

It was obvious the above responses were hurriedly made because the copy was returned to me with those handwritten notes on its face. My thoughts are that these are honest biases, and I concur completely with them. I do believe these type get-togethers have values to both government and the other world.

Further, LaPage's paper was easily read and has good flow. I strongly agree with him, suggesting the public parks and recreation agencies (all) seek new directions toward cooperativeness with the private sectors to free the government from this recreation business. I do see the agencies as innovator - experimenter in the middle ground between resorts and wilderness; mostly, however, as market research in the need/demand area with some prototyping. I also see the middle ground between outdoor resorts and wilderness area as a gold mine of opportunities for private recreation managers to fill those needs and demands.

[1/] James D. Haynes, Forest Recreation Manager, Gulf States Paper Corporation, Tuscaloosa, Alabama. (The Forest Recreation Department is operated as a Business within the Forestry Division. It's assignment is to function separately and maximize the profits for it's parent company using those resources it deems profitable.)

In looking ahead; I believe it is time "Mom and Pop" type concessions as well as the commercial franchisor be encouraged on present public lands (not a purchased buffer zone as suggested by Fuller) provided they return an income to the controlling agency for value received from the resources used. This encouragement should perhaps even include some risk capital.

In conclusion, we strongly believe that the USER and not the TAXPAYER should pay for outdoor recreation. We feel realistic values should be established for recreation products and services no less than the lumberman pays the Forest Service for their timber or the oilman pays the Park Service the royalties due. I personally see no fault with public recreation users returning to the nonusers as well as the user himself a profit in form of lower taxes to fund those public agencies.

I believe LaPage's paper was needed, is timely and hopefully will be heeded. I wish to thank you and Mr. Cordell for inviting me to participate.

COMMENTS

ABSTRACT

SHERIDAN

Comments on the Workshop.--There is NO reason why research and management cannot work together. It can be done officially or unofficially, all that really is required is the desire to.

SELECTED PAPERS PRESENTED AT THE NATIONAL RECREATION RESEARCH APPLICATIONS WORKSHOP, ESTES PARK, COLORADO, 1974

ABSTRACTS

BURY, MCCOOL, AND WENDLING

Research on Off-Road Recreation Vehicles: A Summary of Selected Reports and a Comprehensive Bibliography.--This report summarizes major published research findings concerning recreational use of ORVs. Coverage is restricted primarily to the United States, although literature relating to snowmobiles includes Canadian references. Most included materials have been prepared and released since 1970. But because the rapid growth of ORV usage is so recent, research has progressed minimally beyond identification and description of problems.

CORDELL

The Literature of Planning and Managing Intensively Developed Natural Resource Recreation Sites.--Literature applying to planning and managing developed recreation sites has been classified by type of decision to which it applies, by whether or not it is the result of research, and by degree of applicability. This classification system is intended to assist managers and planners in assessing and applying knowledge contained in the literature. When applied to 130 publications, the classification system revealed that almost 50 percent of the literature deals with maintenance problems and related information. Other areas apparently require additional research attention.

COMMENTS ON THE WORKSHOP

J. A. Sheridan[1/]

Someone thought that it might help the group if a different perspective were presented regarding the issues that have been raised. Consequently, I'm the interloper tagged to reflect back to you what I heard here in this meeting. Because my background is a large public utility, a bureaucracy in itself, we've had many of the problems of cooperative effort that you've expressed in your discussions. Having spent 5 years in management at corporate headquarters, I know a little about where of I speak.

In a nutshell, as agent 88 would say, we have here the old research-management-extension service trick. The trick is how do you make it work. Let me see if I can address that from a variety of directions. I'll do this by translating the issues into questions that should be asked and answered if you're to overcome the communications problems that exist.

- Mr. Manager, do you do planning?
- Do you have a long term and short term plan articulated in such a way that others can read and understand it?
- Mr. Manager, why is it that you have urgent needs for short term research?
- What is it about the field manager's job that causes the need for short term research?
- Mr. Manager, are you managing or are you doing other things - such as administration and politicing?

I place no qualitative value judgment on the aspects of management that are related to but not really management. Such things as giving talks at chambers of commerce or Lions, etc. are necessary but not the management of the resource entrusted to you. And finally, Mr. Manager, are you using Research as a PYA, that's a "Protect Your A short three-letter word ending in S" position to cover for high risk decisions that are not research at all, but management perogatives to begin with?

I have a few questions for the scientists also. I don't want anyone to feel left out.

- Mr. Scientist, would you please describe to me that last new theory that you developed?
  If not the last new theory that you developed, how about the last new one that was in your area of speciality?
- Mr. Scientist, what have you personally added to the scientific body of knowledge that has advanced that body of knowledge?
- Mr. Scientist, why can't research be couched in "real time" problems that also add to the development of theory and the advancement of scientific knowledge?

1/ American Telephone and Telegraph Company, New York, New York.

. Mr. Scientist, how much of your work that you labored over to contribute to mankind has been implemented and is contributing to mankind?
. Mr. Scientist, have you considered taking some courses in public relations?

I could go on to include others such as administrators, extension services and policymakers, but time does not allow. Instead, let me say that the questions I've asked were meant for you to take personally as you see fit. Those same questions I asked in my own company. This recreation group does not have a corner on the market when it comes to problems of cooperative effort.

Let me say that there is NO reason why research and management cannot work together. It can be done officially or unofficially, all that really is required is the desire to.

The Bell System solved some of these problems by making some researchers into managers who could now translate research into action that could be copied by other managers. Other problems are solved by problem solving teams. Teams that can draw on a variety of expertise from anywhere in the company. The concept is called a Matrix Organization and I suggest that this concept could, in a modified form, be of use to the furthering of the quality of outdoor recreation. The Bell System recognizes that scientists and managers are different. They also have to be appraised differently. I personally believe that most scientists would like to see their work employed and that is indeed part of their reward system; they also like to eat. We pay ours well, but most are expected to work on the company's problems, not esoterics. To that end, there are research review teams that have field managers as part of the team. There is generally some time allowed for personal interest research, in your language that would be basic or pure research. There are many existing mechanisms in industry that would lessen your communications problem. I suggest you appoint a working group to investigate those techniques actually used in industry to overcome similar problems.

As someone said earlier in the meeting, "You would be had for lunch," if you were in a competitive situation.

It has been a real pleasure for me to attend your meeting and I want to thank Stu Davey and Neil Stout for suggesting that I attend. And Ken Cordell who graciously extended the invitation. I know it is difficult to invite an outsider into your midst to hear some of your most private concerns. I thank you for that opportunity.

RESEARCH ON OFF-ROAD RECREATION VEHICLES: A SUMMARY OF SELECTED REPORTS AND A COMPREHENSIVE BIBLIOGRAPHY

Richard L. Bury, Stephen F. McCool, and Robert C. Wendling[1/]

Abstract.--This report summarizes major published research findings concerning recreational use of ORVs. Coverage is restricted primarily to the United States, although literature relating to snowmobiles includes Canadian references. Most included materials have been prepared and released since 1970. But because the rapid growth of ORV usage is so recent, research has progressed minimally beyond identification and description of problems.

INTRODUCTION

Off-road vehicles (ORVs) have become a pervasive factor in the use and management of rural lands since the late 1960's. Conflicts between ORV users and non-users have occurred both on private lands, and on public lands where both groups are equally entitled to enjoy benefits of the resources.

The ORV phenomenon, as seen throughout this report, is an extremely diverse one. It consists of a complex interaction among (1) people's attitudes, preferences, and behavior; (2) environmental factors such as land use, and effects of ORV traffic on soils, vegetation, and animals; and (3) machine-related aspects such as vehicle type, engine size, and type of tires. Within the framework of this reocgnized complexity, the manager must seek optimal solutions through maximizing advantages and minimizing disadvantages associated with providing and maintaining ORV recreation opportunities.

Research can provide basic support information required for such optimization of ORV management.

This report therefore seeks to summarize major published research findings concerning recreational use of ORVs. Readers interested in current, unreported research are advised to search through computerized systems such as the Smithsonian Science Information Exchange and the Current Research Information Service (U. S. Department of Agriculture).

Coverage is restricted primarily to the United States, although literature relating to snowmobiles includes Canadian references. In addition, coverage has been expanded beyond formal research efforts to include selected basic information and concepts from administrative reports and technical articles.

Most included materials have been prepared and released since 1970. Because all materials are so recent, in-text citations do not indicate year of publication except as necessary to distinguish between items attributed to the same author.

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Because the rapid growth of ORV usage is so recent, research has progressed minimally beyond identification and description of problems. Further, most ORV research relates to snowmobiles, and is a direct response to the exceedingly rapid growth in usage of that machine.

Several individuals have led in identifying and defining management issues and in providing research information currently available on ORVs; among these have been Baldwin and Stoddard, Lodico, the U. S. Department of the Interior's Task Force on Off-Road Vehicles, McCool and Roggenbuck, and speakers at the 1971 and 1973 Symposia on Snowmobiles and Off The Road Vehicles held at Michigan State University and edited respectively by Chubb and Holecek.

An in-depth bibliography is provided; in it are cited many documents not discussed in the text. A table helps the reader find all items in the bibliography that are relevant for each of the twenty-eight subject areas presented in the text. The bibliography itself represents a detailed search of (1) relevant printed indexes; (2) the excellent bibliography on ORVs available from Lime and Leatherberry; and (3) computer searches within the data bases of the National Technical Information Service (NTIS), Psychological Abstracts, Social Sciences Citation Index, and the Cataloging and Information system (CAIN) of the U. S. Agricultural Library.

ECONOMIC ASPECTS

Numbers of ORVs: Production, Sales, Vehicles in Use, and Projections

The below excellent summary and prediction for numbers and sales was prepar by Stupay in 1971 (p. 15-17):

> With rising income, favorable age mix changes, and growing suburbanization and leisure, recreational vehicle usage will continue to rise. Total recreational vehicle sales are expected to rise by over 3.5 percent annually from 1.8 million units to 2.5 million units annually by 1980. The various vehicle markets are reaching a high level of penetration and there does not appear to be a new major vehicle such as the motorcycle or snowmobile to continue the 1960's explosive growth . . .
>
> Motorcycles and mini-bikes and cycles are expected to lead in growth and in usage. In 1970, some 730,000 motorcycles and nearly as many minicycles were sold. Sales are expected to lift to 850,000 units by 1980, with registration rising from 2.7 million in 1970 to some 5 million in 1980 . . .
>
> The snowmobile achieved phenomenal growth in the 1960's . . . shipments rose rapidly to 190,000 units in average 1966/68 and to more than 500,000 units in 1969 and in 1970. United States sales peaked at 317,000 in 1969.
>
> Snowmobile sales will continue to grow but at a sharply reduced rate . . .

Although Stupay's predictions seem carefully made, three major occurrences since 1971 may produce experience considerably at variance from his predictions. First, the predictions rest on assumptions of participation rates which may chang in ways different than predicted. Secondly, the petroleum supply and cost situation may depress purchases and use; and lastly, America's economic condition of simultaneous economic stagnation and inflation ("stagflation") may well induce consumers to purchase fewer ORVs and to use their current ORVs less than predicte

As of 1973, American and Canadian snowmobile owners possessed an average of 1.8 snowmobiles, and had owned in total an average of 2.9 snowmobiles since the machines became available. Also, 63 percent of the total respondents in the Wino survey of 1973 indicated that they planned to buy a snowmobile within the next tw years (p. 1,15).

Writing in early 1975, Doyle indicated that the snowmobile market was stabilizing to an expected sales level of 250,000 units per year; producers had shru from more than 100 firms to as few as ten firms producing more than 500 units (p. 12). The industry hoped to expand sales through the next few years by developing safer and quieter machines, and by encouraging development of more snowmobile tra and riding areas (p. 13).

Motorcycle numbers and sales are more difficult to obtain; the below figures are worldwide:

> Sales of motorcycles increased from approximately 60,000 in 1960 to

1,430,000 in 1970. The industry expects to reach annual sales of 1,700,000 units by 1980. The motorcycle figures above do not include minibikes, of which nearly 700,000 were sold in 1970. Estimates of total off-road use are further complicated because nearly half of the vehicles registered for road use possess some off-road capability. An estimated 30 percent of these are occasionally used off the road [in the United States]. (Baldwin and Stoddard, p. 5,6)

Much less information is available for dune buggies and all-terrain vehicles (ATVs). As of 1973, the Department of the Interior estimated that 200,000 dune buggies were in use in the U.S.; manufacture and sale of these ORVs was growing rapidly at that time (Baldwin and Stoddard, p. 6).

Economic Impacts and Trade-Offs

The economic impacts of ORVs during any given year will depend on factors such as weather, seasonality, general level of regional and national economy, price of machines, numbers sold, fees which may be paid, and servicing costs . . . (Michalson)

To the economist, economic impact studies require a rigorous methodology such as that presented in Michalson's paper, "A Methodology for Determining the Economic Implications of Off-Road Vehicles." Most of the studies reported were considerably less rigorous than Michalson, and thus should be regarded as first approximations only.

Total expenditures related to snowmobiling during the 1973/1974 season in Michigan/Wisconsin / Minnesota were estimated to be $506 million. This included $396 million capital expenditures, $37 million repairs, $7 million registration fees, and $7 million collected in gasoline taxes (Gogebic c. 1974).

During the 1974/1975 season in New York, snowmobilers spent $84 million on snowmobile-related purchases and activities; in addition, the State treasury received $4-3/4 million from registration fees, gas taxes, and sales taxes (ISIA 1975, p. 1).

The size of the snowmobile-related industry in 1972 is illustrated by the following:

Counting allied equipment fields and service functions, the annual sales of the industry surpass $1 billion. Almost 100,000 people in the U.S. and Canada are directly employed by the industry, utilizing over $1 billion in capital investments . . . Case studies of the impact of the snowmobile industry have been prepared for several states. Minnesota represents a special case--over thirty percent (30%) of all snowmobiles produced in North America are made in this state. Direct industry employment in the state exceeds 19,500 people, with a combined personal income in excess of $126.6 million (Doyle 1974.c., p. 9).

Effects on Resource Owners and Managers

Profitability of areas for ORV use has received little attention by researchers. However, a study of eight snowmobile areas in central New York (Moeller) revealed that successful operations should usually contain 300 acres or more, half of which should be wooded, be located "within a 1-hour driving radius of at least

100,000 people," and "be situated in a region of heavy snowfall . . . Several operators felt that a 10 week season, with a minimum continuous snow cover of 4 inches, would be required to break even on their investments." (p. 7,9) Rental fees for snowmobiles, under the competitive conditions of 1970-1971, were insufficient to produce profitable enterprises; operators felt that profitability could not be assured without supplemental enterprises such as fuel, repair parts, accessories, and maintenance (p. 11).

Average development cost for snowmobile trails has been reported to range from zero to $300 per mile. The Hoosier National Forest in southern Indiana expects to spend $1,000 per mile for double-track ORV trails and $500 per mile for single-track trail (U. S. Forest Service, Hoosier National Forest, p. 34).

Operation costs for snowmobile trails also showed considerable variation, ranging from $50 to $210 per mile per season (Keenan, p. 216; Hetherington 1971b, p. 148; Armstrong, p. 171-172). Yellowstone National Park expended $45,000 grooming 208 miles of snowmobile trail in 1972; this calculated to an average cost of $210 per mile for the season (Armstrong, p. 171-172).

Comparable studies for other types of ORVs were not discovered.

Effects on ORV Operators and Owners

During the 1973-1974 season in Minnesota/Michigan/Wisconsin, the average snowmobiler spent $367 on equipment (Gogebic 1974, p. 62).

The average cost of a snowmobile in this three-state area circa 1970 was $903 (Potter, p. 65). Ontario snowmobilers invested an average of $1,200 per owner during the 1965-1970 period in snowmobiles and related equipment; these expenditures were about 84% for the basic machine, and 10% for special clothing. The estimated expenditure on snowmobiles and related items during this 5-year period was $120 million (Ontario, p. 34-36).

The owners' average expenditure per day of machine operation was $18.20 in the above three-state area during 1973/1974 season (Gogebic c. 1974). Details from this same study reported the following averages of 12-month seasonal expenditures: $45 repairs, $52 snowmobile gas and oil; $25 insurance; $56 general trip expenses when snowmobile was trailered, and $69 general trip expenses when snowmobile was not trailered (Gogebic 1974, p. 63-65).

In combining both investment and usage costs, the average yearly expenditures related to snowmobiles during the 1973/1974 season in the above three-state area was $543 per machine (Gogebic c. 1974).

Again, comparable information for other ORVs was not found.

Effects of Petroleum Shortages and Stagnation/Inflation

Within the combined states of Minnesota/Michigan/Wisconsin during the winter of 1973/1974, the petroleum shortage apparently induced a reduction of 5,689,000 user days of snowmobiling (Gogebic 1974, p. 3,53); this was a 28 percent reduction as compared with the previous season.

Snowmobile sales were depressed during the period of November/December 1973

when the petroleum shortage first became severe. The industry estimates that 30,000 units were not sold as a direct fear of energy shortage (Doyle 1974a, p. 11).

BEHAVIORAL ASPECTS

It appears that many or most managerial techniques need to deal with people and their actions, rather than with the impact of ORVs on the environment. For example:

> " . . . some of man's basic rights are involved in the off-road vehicle issue--conflicts such as the rights of the individual versus the state, individual property rights versus common public rights, and economic growth versus the quality of life." (Dunn 1971, p. 165)

> "Public concern as discussed here reflects conflicts of interest, an invasion of privacy, and direct interference by snowmobiles with other winter sports activities in the same geographic area . . ." (Griffith, p. 5)

Social Demographics

Many research reports have described the social demographic characteristics of ORV users. Individual ORV users were found to be at least as varied as the machines. In spite of this, drivers of all ORV types showed a great tendency to form clubs.

A comprehensive survey of snowmobile owners in North America yielded these findings: 66 percent of the households surveyed owned two or more snowmobiles; average age of the owner was 38 years; 86 percent were married; households averaged 4.2 persons; 70 percent had an annual income greater than $10,000 dollars; 65 percent were non-urban (i.e., from a town of less than 25,000 population or residing not within 20 miles of a city of 100,000 population). Occupation ranged as follows: 21 percent were craftsmen/foremen, 15 percent were managers/proprietors, 15 percent were operators, 11 percent were farmers/farm managers, 11 percent were professional/technical, and 25 percent were classified as other (Holecek, p. 55).

Plumb (p. 132) characterized the dune buggy and 4-wheel drive owner who utilized Back Bay National Wildlife Refuge as 28 years of age, male, married with two children, two years of college, and a manager or administrator with an annual income of $10,000 to $20,000.

Peine (p. 32-34) found conflicting results in his study of the Tucson Jeep Club and Tucson Sandbuggy Association. In comparing the two clubs, results indicated that members of the jeep club had higher average incomes, educational levels, and more were white collar workers. However, average age (34 years) and average family size (four) were very similar for both clubs.

Values and Attitudes

Several recent studies have begun to reveal the values held by ORV enthusi-

asts, and the motivations underlying their behavior. Peine (1972) found that ORV users have orientations toward the land, the machine, and the activity. McCool (1974) hypothesized orientations toward the land, the machine, and the activity. McCool (1974) hypothesized orientations toward the machine, the environment, and other people.

Bury and Fillmore (p. 34-36) found that most campers regarded cyclists as self-centered, anti-social, inconsiderate of the rights and feelings of others, highly motivated, and unintellectual. In comparison, riders saw themselves as socially accepted, highly motivated, and considerate of the feelings of others; they rated themselves lowest in the intellectual dimension.

Roggenbuck and McCool (p. 12,13) best summarized land use conflicts in comparing land managers with ORV users. The former have traditionally been trained in the natural sciences--with concepts of sustained yield, multiple use, and preservation. ORV use is not compatible with their naturalistic value system. The ORV user, on the other hand, does not have a naturalistic value system and views the ORV as an appropriate means of enjoying the recreational opportunities of pub lic lands.

Knopp and Tyger (p. 14,15) reported that snowmobilers and ski-tourers posses statistically significant conflicting attitudes on various recreation land manage ment issues. Basically, snowmobilers felt managers should place fewer restrictio on recreational uses of land, while the ski-tourers recognized a need for occasio restrictions.

Expectations and Preferences

While few attempts have been made to assess ORV users' expectations, several early snowmobile surveys revealed interesting patterns of activity preferences. For example, Gogebic Community College (1974, p. 73-90) conducted an extensive survey of snowmobiler preferences and opinions in Michigan, Minnesota and Wiscons see also Ontario Department of Tourism, Lindsay, Kuehn, Kopischke, Bury and Fillmore, and Johnson et al. Details of findings are too voluminous for description here. However, we may draw upon these studies for general guidelines if we are willing to assume that preferences are idealized expectations.

The Forest Service's Environmental Impact Statement on ORVs (USDA Forest Service, p. 10-13) also deals with user expectations and preferences. A review of public responses identified four main issues of specific interest to the publi They were (1) alternatives for implementation of ORV regulations, (2) designation of areas, (3) the time frame to complete the designation, and (4) the exemption of ORVs used in mining pursuits from regulations governing all other ORV use.

Characteristics of Use

Several studies provide detailed information on characteristics of ORV usage. For example, the Ontario Department of Tourism study of snowmobilers revealed tha the most common frequency of use (median) was between 21 and 40 days per season; the overall average (arithmetic mean) was 41.9 days. This usage was distributed almost equally between weekend days and weekdays; the average duration was 3.7 hours per day. Over half of the respondents stated that more than one-fourth of their snowmobiling occurred at night.

In contrast, a survey of Michigan snowmobilers (Michigan Department of Natura

Resources et al., p. 30-40,46) revealed an average of 24.6 days of snowmobiling per season; the average after-dark snowmobiling was 13.0 days. Respondents spent an average of 14.7 days on their own property or that belonging to relatives or friends, 7.8 days on state or national Forest lands, 1.5 days on corporate land, 1.2 days on metro and city parks, golf courses, school property, etc., 0.4 day on state park and recreation areas, and 0.4 day outside of Michigan. This distribution was, of course, affected by the location and relative abundance of lands, and managerial actions relative to snowmobiling on the various land ownership classes.

A survey of operators of dune buggies, trail-bikes, and minibikes found that the four most popular activities were informal competition, hill climbing, camping, and sightseeing (Johnson et al., p. 4,5). The average operating time was five hours per day, with minibikes averaging 3.2 hours and dune buggies averaging 6.6 hours. Members of the average respondents' household spent two weekends per month at a use area, with an average of 1.9 Saturdays and 2.1 Sundays. Most of these ORV users operated their machine with family and friends, while considerably fewer operated alone or with organized clubs.

Peine's comparison of the Tucson Jeep Club and Tucson Sandbuggy Association indicated that sightseeing and exploring were the most popular activities of all ORV owners interviewed (p. 32,33). Most travel was to, and within, established recreation areas; very little was cross-country. The typical trip of both clubs consisted of one-day sightseeing, a picnic lunch, and a travel distance of less than 100 miles.

Activity Aggregation

Use of ORV's is generally associated with other identifiable recreational activities. In many instances, a specific set of activities (activity aggregation) is associated with a given ORV activity. For example, Dahms (p. 15) found in a nation-wide survey of trail-bike and motorcycle users that the most popular single hobby (after motorcycling) was hunting and fishing, followed by camping. Though figures on participation in hunting and fishing were not provided, 79 percent of the respondents camped when they rode.

At Land Between the Lakes in western Kentucky, Chilman and Kupcikevicius (p. 7) found swimming to be the most popular accessory activity of trail-bike riders, with 48 percent of the riders participating; camping followed with 44 percent, and picnicking with 38 percent.

In a study by Holecek (p. 56), 72 percent of the snowmobile riders had fishing licenses, 77 percent had hunting licenses, 18 percent had 4-wheel drive vehicles, and 50 percent had boats.

Conflicts Among Users

Conflicts among recreational users and non-users of ORVs have been identified as one of the ten most important questions related to ORVs in the West (Mc Cool and Roggenbuck; v. 1, p. 22,23).

Conflicts between ORV users and non-users may be grounded in noise, knowledge of the machine's presence (or having been present), fear of personal harm, and physical impacts on the environment (Butler, p. 9).

Lindsay (p. 7-25) surveyed the extent and cause of outdoor recreation conflicts in Vermont. Results of particular interest were that: (1) snowmobilers and homeowners were the two groups most often in conflict; (2) conflicts most commonly occurred at night in urban and suburban residential communities; (3) groups creating the greatest amount of conflict were those requiring fairly lar land or water areas for their activity, those using private land, and those wit out designated areas for their sport; and (4) the causes of conflict included discourtesy, litter, noise, safety, trespass, vandalism, and competition for space.

In a study by Bury and Fillmore (p. 32,33), campers were asked to name and rank the three main disadvantages of having a motorcycle area near a campground. Noise led all the rest by a wide margin. However, their answers may well have represented biases rather than experience.

Many ORV operators use their machines on hunting, fishing, and camping trips (Fluharty; p. 17; Chilman and Kupcikevicius, p. 7); this clearly points to possible conflict situations. For instance, Malaher (p. 431) suggests that conflicts could arise from snowmobilers disturbing wildlife being hunted by others on foot.

A major problem in the east has been the operation of ORVs on private land without prior consent of the landowner. In the west, conflicts with the traditional consumptive uses of land-based resources have occurred. For example, Fluharty (p. 13,14) cited a Bureau of Land Management report which described soil compaction and destruction of range vegetation. These impacts lead to a reduction in productivity of the range for beef. Additionally, range fires have been started by motorcyclists, and some ranchers even describe their cattl being chased by motorcycles.

Depreciative Behavior

These human acts reduce or destroy the resource and facilities, or interfere with the experience of other recreational participants. Although depreciative behavior among ORV participants was frequently the subject of resource manager reports and informal discussions, scientists have not yet specifically focused on the depreciative behavior of ORV participants.

The array of potential depreciative behavior forms is broad: vandalism, theft, trespass, rule violations, and destruction of archaeological sites. For example, Baldwin and Stoddard discuss the increasing frequency of thefts and vandalism during the winter at properties largely inaccessible before the snowmobile.

Motivations for depreciative acts in other recreational environments have been typologized as entertainment, convenience, disregard, ignorance, and interference with personal goals (Clark, Hendee, and Campbell, 1971). Whether this typology will apply also to ORV operators is a question needing considerable research.

Perception of Images

Snowmobilers in a two-county area of New York were questioned about their awareness of snowmobile effects on wildlife and damage to vegetation (Hill 1971,

p. 6,7,15). Only 7 percent of the respondents reported observing damage to wildlife; the foremost incident was intentional harassment of animals. Thirty-seven percent of the respondents reported benefits such as use of snowmobile tracks by deer, snowmobilers carrying food to wildlife, and rescue of deer chased by dogs. Hill also noted that 28 percent of the respondents reported substantial vegetative damage by snowmobiles; seedling and shrub damage was most frequent.

Peine's (1969, p. 33) investigation of Tucson Jeep Club and Tucson Sand Buggy Association members indicated that the clubs were aware of rising public concern for deterioration of the countryside caused by ORVs. In fact, they were so concerned that they carried out conscientious programs to minimize damage to areas they visited.

SAFETY ASPECTS

Noise

The level, duration and physical frequency (wave-length) of noise may have extensive impacts on the health and safety of ORV operators and spectators.

Most studies related to health and safety aspects of ORV noise have investigated temporary shifts of hearing thresholds and ringing ears (tinnitus). Bess (1971, p. 154-155) reported a high probability of hearing damage following exposure to only 30 minutes of full throttle snowmobile operations.

Following exposure to snowmobile operation, one-third of the males and one-fourth of the females in a study reported ringing in the ears, and about 18 percent experienced temporary changes in hearing (Stahl and Bess, p. 9). The results of another study (Bess and Poynor, p. 166) strongly suggested that continued operation of snowmobiles will result in significant hearing damage.

While the authors have found only limited experimentation concerning motorcycle noise and hearing damage, several investigators (Bess 1973, p. 7; Harrison 1973, p. 27) have reported that helmets do not provide adequate hearing protection, especially at speeds below 45 m.p.h.

Deaths and Injuries

Several authors (Fleming 1969; Fleming, 1974, Vila and Klopchic, and Mc Lay) have reported on accidents associated with snowmobile use. One study of snowmobile accidents found the collision rate five times that of other motor vehicles and the death rate six times as great (Vila and Klopchic, p. 37). Factors which appear to contribute most to snowmobile-associated injuries are jumping the vehicle, lack of experience, poor visibility, speed, alcohol, barbed wire, climbing over banks, equipment not in repair, and thin ice (McLay). Exposure and hypothermia are also contributing factors (Rand, 1969).

The safety and health hazards associated with other types of ORVs have been extensively discussed before (Bureau of Transportation Safety; National Motor Vehicle Safety Advisory Council). Both reviews suggest a strong need for systematic data collection to determine causes of accidents, and detailed

study of collisions, in order to devise and implement safer equipment, facilities, and operational regulations.

Safety Equipment

Daytime use of motorcycle headlights significantly reduced the accident rate of motorcyclists in states requiring such operation (Janoff et al.). Further, use of a helmet significantly reduced casualties occurring in motorcycle accidents (Allsop 1967; Lunenfeld and Varady 1970, and Richardson 1974).

The following items appear necessary for safe operation of snowmobiles: dead man's throttle, roll-bar, crash helmets, goggles, and protective clothing (Percy).

TECHNOLOGICAL ASPECTS

Noise

Many conflicts with other recreational activities originate with noise. In the last few years, technological advances by manufacturers have reduced noise production, and most states now have standards establishing the maximum permissible noise generated from ORVs (International Snowmobile Industry Association, 1974b). Noise will probably continue as a difficult managerial problem--and especially so as more persons visit recreation areas, and ORV noise therefore affects more non-ORV users (Lindsay).

Noise generation from snowmobiles and motorcycles has received considerable attention in the literature. Central to an understanding of the noise issue is the concept of "vanishing distance"--the distance under which ORV-generated noise becomes inaudible above the always-present "background noise." Vanishing distance depends on the amount and physical frequency (wave-length) of noise generated at the source, and intervening vegetational/topographic/atmospheric conditions.

Researchers report somewhat contradictory results of vanishing distance across similar vegetational types (Harrison, 1974d). The Motorcycle Industry Council (1973) indicated that the vanishing distance within a wooded area varied from 1600 feet for a 76 dB source to 12,800 feet for a 90 dB source. Operation of two or more ORVs will apparently increase the total noise generated only slightly (Harrison 1974d, p. 7).

The variation in noise generation by ORVs is great. Harrison (1974b) tested 10 different motorcycle models in a drive-by procedure and found a range of 74 dB-93 dB, measured at 50 feet on the A scale; vanishing distances varied from 1400-3900 feet. Noise tests of 15 different models of 1969-1972 snowmobiles ranged from 77 dB-99dB (Harrison 1973c). In general, he found that the older the model, the greater the noise generation.

Both the American Motorcycle Association (AMA) and the International Snowmobile Industry Association (ISIA) have responded to the noise issue by developing programs and vehicle changes to reduce noise generations (AMA n.d.; Doyle 1974a; Doyle 1974b). Additionally, the Noise Control Act of 1972 (U. S.

Congress 1972a) gives the Environmental Protection Agency authority to develop and implement standards for maximum noise levels produced by recreational vehicles.

Exhaust Emissions

Extensive programs of exhaust testing and monitoring are continually conducted by the Environmental Protection Agency and various manufacturers.

The total impact of lead contamination on a community water supply is probably variable depending on the intensity of the snowmobile use. Heaviest concentrations of lead were found at 1-1/2 feet from the midpoint of the snowmobile track (Ferrin and Coltharp, 1974).

Because many types of ORVs could cause wildfire, requirements and standards have been established on both state and federal levels for the use of spark arrestors (U. S. Department of Agriculture).

Resource and Facility Needs

In a California study of owners of mini-bikes, dune buggies, cycles, four-wheel drive, all-terrain vehicles, and other ORVs, 68 percent of the 1,210 respondents strongly agreed that most public lands should be available for some form of ORV use (Johnson et al., p. 5). The most common demand expressed in comments found on 688 of the returned questionnaires was "Give us more land." Other comments frequently expressed dealt with expressions of preference for large and relatively unregulated areas, recommendations for one-way riding trails, separation of two-wheeled vehicle use areas from four-wheeled vehicle use areas, special juvenile operating areas convenient to cities, and requests for information on legal riding areas throughout the state.

Hetherington (p. 76) stated that snowmobile resources and facilities should include a minimum snow depth of three inches; varied topography; adequate parking; snack bars and restaurants; and trails with points of scenic or historical interest, scenic outlooks, trails connecting towns, and/or designed for multiple use (e.g., snowmobiling, trail-bike riding, horseback riding, skiing, and snowshoeing), systems with spider-web design including loops at 1, 5, 10, 25, and 50 miles, and a sign system and posted maps along the trail. In contrast, Vila and Klopchic (p. 34) found that Ontario snowmobilers preferred "unorganized, open lands, bush and wooded areas in a hilly landscape with no special facilities except snowmobiling trails." Respondents further indicated little interest in organized areas with facilities.

Design Standards for Trails

Existing standards appear to consider management objectives with respect to type of ORV and type of experience desired, reduction of conflicts with other wildland uses, safety, minimization of environmental impacts, and amount of expected use.

The U. S. Forest Service (1974) has developed recommended trail design standards for both one-and two-track ORV trails. Bury and Fillmore (1974), from their field study of trail-bike riders, suggested one-way trails, maximum trail width of six feet, maximizing the number of jumps, and varying the

radii on turns (p. 41-44).

ENVIRONMENTAL ASPECTS

Research indicated some distinctly different environmental impacts from snowmobiles than from other ORVs. For example, soils are affected little by snowmobiles (Pendleton et al., p. 2,5; Walejko et al. 1972 and 1973), but are substantially affected by other ORVs (Davidson and Fox, p. 388-389).

The best bibliographic study of environmental impacts to date is the literature review by Lodico in 1973 for the U. S. Department of the Interior. In the interest of avoiding duplication, most of her extensive text findings will not be referenced herein. Other major compilations are in Baldwin and Stoddard (especially pages 8-33) and in Proceedings of the 1971 and 1973 Symposia on Snowmobile and Off-Road Vehicle Research edited respectively by Chubb and Holecek.

Systematic investigation and experimentation concerning impacts must acknowledge the influence of various types of ORVs, operating conditions, soils and plant and animal communities. The combinations (and therefore, complexity) of environmental and technological variables are vast; therefore, virtually any study conducted on this topic will lack generalizability. For example, a 250cc motorcycle driven over a sandy soil 25 times in one week in a semi-arid climate will have quantifiable impacts. But, impacts may be markedly different if the soil is finer texture.

Effects on Vegetation

Snowmobiles were shown to produce considerable vegetative damage above the snow (Wanek 1974, p. 150; Wanek 1971a, p. 127; Wanek 1971 b; Wanek 1973a, p. 38; Meitz, p. 80). In contrast, damage below the snow depended on depth of snow and intensity of snowmobile use. Compaction by snowmobiles produced lower ground temperatures and retarded the growth and reproductive success of early spring flowers (Wanek, all references).

Woody plants were found more vulnerable to mechanical damage than herbaceous ones (Wanek 1974, p. 21); this could be advantageous in powerline rights-of-way and other locations where managers wish to discourage woody vegetation, and argues for use of such rights-of-way as snowmobile trails (Wanek 1973, p. 38).

Response of alfalfa to snowmobile traffic was also tested at four locations within Wisconsin by Walejko et al. Damage appeared related to snow depth and type, and was directly attributable to the temperature and/or smothering effects from "compacted snow or ice sheets which occur on trails in certain types of snow." (Pendleton 1972, p. 6) These results were obtained on 3-year-old, well-established stands. Alfalfa under fairly deep snow showed no reduction in yield during the following year; under thin snow, yields were reduced as much as 30 percent (Walejko et al. 1973, p. 273).

Bluegrass, brome grass and other such forage grasses appear very resistant to damage by snowmobiles (Walejko et al., 1972, p. 166). In the Wisconsin study cited above, "Heavy snowmobile traffic imposed on established bluegrass areas resulted in no reduction in yield but stands did recover at a slower rate

in early growth and vigor. Late bluegrass harvests during the summer were similar in response to early harvests." (Walejko et al. 1973, p. 166)

The impact of snowmobiles on young hardwoods and conifers in New York was greater on slopes than on the level, due to the churning action of the snowmobile belt (Meitz). The study indicates considerable variance in results, details of which will not be reported here.

Off-road motorcycling in the Mojave desert appeared to increase the representation of some vegetative species; of course, the representation of most species decreased (Davidson and Fox, p. 389). In a carefully-documented article on ORV effects upon the California desert, Stebbins found that:

> The overall effect of ORVs on desert vegetation is to reduce the variety of native species and the size of their populations. In areas of heavy use they completely denude the landscape, and recovery is expected to require many decades, if it occurs at all. (Stebbins 1973b, p. 296).
>
> Unfortunately, ORVs are often attracted to those very parts of the desert where the flora (and associated fauna) is likely to be most varied and where novelties are most likely to occur--near water; in regions of topographically varied terrain; and in the vicinity of dunes. (Stebbins 1973b, p. 295)

Effects on Animals

Snowmobiles created little effect on larger animals and mixed, moderate effects on medium-sized animals; small animals overwintering in subsnow environments were drastically affected.

Large animals. Most research concerning large animals has been tied to the effects of noise and movement of snowmobiles in creating disturbances of the animals. Deer did not significantly increase or decrease their home ranges during three weekends of snowmobiling, nor did their rate of travel increase under conditions of snowmobiling (Bollinger et al., p. 4, 25-30). The results indicated that . . . "under the conditions of this study, snowmobiles have to be within sight of the deer before the animal will react by moving away." (p. 6)

Therefore, this study failed to support the allegation that deer increase their movement and thus become physically stressed in response to snowmobile traffic generating 45 to 65 dBA at the point of deer reception. This conclusion was reached with as many as 31 snowmobiles in operation on the test area during a 4-1/2 hour period. The research also revealed that deer will change home ranges markedly even if snowmobiles are not present.

A somewhat parallel study on white-tailed deer was conducted by Dorrance et al. in northern and central Minnesota during the 1973-1974 winter. Results were not in all cases supportive of the Bollinger et al. study. As in the Bollinger findings, Dorrance discovered that light snowmobile traffic displaced deer from areas immediately adjacent to the snowmobile trails, but that further snowmobile traffic had little effect on deer movement (p. 1,2).

Elk appear more sensitive than deer to the sight and sound of snowmobiles (U. S. D. I. Bureau of Land Management, Utah State Office, p. 1,2). The Bureau of Land Management (BLM) study indicated that only a few snowmobiles would cause an entire elk herd to move away from the machines; this finding is parallel to that of the Bollinger, Huff, and Dorrance studies related to deer.

Medium sized animals. Animals of intermediate size exhibited no general responses to snowmobiles. Snowshoe hares avoided snowmobile trails, for example, but red foxes were more active near and in such trails (Neumann and Merriam p. 211).

Another study discovered that red, grey and fox squirrel activity was apparently no different in the area of snowshoe trails than snowmobile trails (Huff et al., p. 28). This same Minnesota study indicated that red fox used snowmobile trails less than snowshoe trails (p. 28). It was also discovered that:

> The number of mammal tracks crossing the snowshoe transects was significantly greater than the number crossing snowmobile trails for six of the nine weeks . . . mammals used snowmobile trails more during times of deep snow or drifting, and when traffic on the snowmobile trail was lowest. (p. 27,28)

The effects on animal populations of humans equipped with ORVs appears to be mixed geographically and with relation to particular species. (Doherty, p. 63; Usher, p. 178-179).

Small animals. Snowmobiles may cause the ill health and death of small animals using the air space (subnivean layer) between snow and the ground surface; this effect occurs through snow compaction by snowmobiles, and its resultant mechanical barrier to the movement of small animals and reduction of the temperature-insulating qualities of snow (Schmid 1971b, p. 107).

The reduction in population of these small mammals could well reduce the population of species preying upon them--hawks, owls, foxes, etc. (Brander). p. 33).

Effects on fish. Accelerated harvesting appears to be the main concern related to impacts of ORVs. The most striking documentation concerned easier access to remote lakes provided via snowmobiles in the wintertime. One report indicated that 556 pounds of fish were harvested from a remote lake on a single day; this would have been an entire season's catch if snowmobile access had not been possible (Cooney and Preston, p. 19). However, the snowmobile has proven advantageous in dispersing fishing pressures on the larger lakes, rather than concentrating fishing near road access points (Doherty, p. 63).

Effects on desert animals. Only a few studies, preliminary at best, were found relating ORV operations to desert animals. The ecology of Dove Springs within the California Desert was studied during a ten year period and changes noted in response to increasingly high use by ORVs (Berry). The tortoise apparently disappeared; the density and diversity of populations of small mammals and lizards was reduced.

Effects on Soil

Snowmobiles produced little mechanical effect on soils (Pendleton et al.,

p. 2,5; Walejko et al. 1972 and 1973).

Soil temperatures during the winter were significantly reduced in the soils immediately underlying snowmobile trails. The temperature differential between soils under undisturbed snow and those under the snowmobile track were in the order of 5° to 9°C (Wanek 1972, p. 3,7). These effects are different within different soil types. At six inches below the surface of fields with three-year old alfalfa stands, the temperature within sandy soils was found to be 2-5°C colder than within clay loam soils on the same days (Wanek 1974, p. 12). In contrast, the temperature responses of bog soils to various degrees of snowmobiling was quite small, being on the order of less than 3°C (Wanek 1974, p. 12).

Soil disturbance by wheeled vehicles is abundantly evident in desert situations (U. S. D. I. Bureau of Land Management, California State Office, 1970b). One such exploratory study was conducted by Davidson and Fox on relatively coarse soils in the Mojave Desert. Although the amount of motorcycle use intensity was not recorded, such use produced some compaction at the surface. Solid bulk density had increased very little, but seemed critical in that infiltration capacity was greatly reduced (Davidson and Fox, p. 388-389). In contrast, Berry found that heavy pounding by ORVs could increase the density of desert soils markedly to a depth of at least three feet; this different finding could be due to differences in soils, use intensities, soil moisture conditions, types of ORV use, and/or methods of soil density measurement.

Within Arctic environments, off-road vehicular traffic is very common. Investigators believe that impacts on soils may be potentially very serious, especially on permafrost terrain (Rickard and Brown, p. 61). Because of fragile soils and short growing seasons, the recovery of ORV tracks has been very slow. Wet and marshy terrain showed more effects than well-drained sites (Rickard and Brown, p. 55).

Effects on Water Quality and Quantity

Snowmobiles appeared to increase the water content of snow in compacted areas, especially in locations where evaporation from snow normally exceeds infiltration (Hogan). Tests also showed that compaction increased snow cover retention. It was alleged that steep and unvegetated roads would thus be protected until after the period of maximum snow runoff had passed. This conclusion was supported by research of Soil Conservation Service snow surveyors, who also suggested that "a systematic contouring of a critical watershed with snow machines offers the potential of actually 'farming' the snowpack for valuable water supplies." (Work and Pearson, p. 35). Thus it appears that snowmobile action within watersheds may benefit water quality through decreased water turbidity, and improve water quantity through lessening losses due to evaporation.

The situation appears to be reversed with regard to wheeled ORVs. Although no rigorous research reports were found in this review, the Bureau of Land Management report on the California Desert contains persuasive observations. The acceleration of both wind and water erosion which undeniably occurs must surely increase water turbidity. In addition, the reduction of vegetation on slopes must also lead to increased runoff at the expense of infiltration and thus increase erosion and hence turbidity. Effects in other portions of the nation were not found, but must certainly be reflected in erosional response

to particular conditions of soil type, intensity of vehicle use and rainfall, type and coverage of vegetation, etc.

ADMINISTRATIVE ASPECTS

In a study of ORV problems (McCool and Roggenbuck), administrative problems were identified as the second most frequently mentioned set of issues dealing with ORVs on public lands in the west; respondents were deliberately diverse--land managers, academicians, conservation groups, and ORV user groups.

Regulations and legislation, enforcement, methods of providing ORV opportunities, liability and legal problems, fees and permits, and management techniques seem to be the principal administrative questions.

Regulations and Legislation

The controversial nature of off-road vehicles is evidenced by increases in public hearings, state and national legislation, and local regulations.

Most of these regulatory statutes are aimed at control over the ORV operator, reduction of environmental damage, protecting the health and safety of the citizens, and establishing organizations for licensing, administration, and on-the-ground management.

A model state ORV law has been developed by the Upper Great Lakes Regional Commission. While it is not the only attempt at comprehensive uniform legislation (see U. S. Congress, 92nd, H. R. 17158, Snowmobile Recreation and Safety Act; National Committee on Uniform Traffic Laws and Ordinances and Council of State Governments) it is readily available for examination and appears to launch a good attack on many administrative, legal, and financial problems.

Enforcement

Few ORV studies have specifically addressed the enforcement of ORV regulations, other than to identify enforcement as a problem. Perhaps managers need to look toward existing enforcement agencies for general assistance and toward criminological theory and practice for specific techniques.

The reaction of individual users to regulation probably influences the depth of an enforcement program. For example, Kopischke found that about 74% of the snowmobilers in Minnesota found the existing regulations just right, 11% felt there were too many, and 15% thought there were too few.

In summary, a variety of factors--including the manager's authority, his ability to enforce, his perceptions of enforcement and regulations, and the users' general outlook in life--will assist the manager in specifying the extent of the enforcement "problem".

Management Techniques

Managerial implications of the above research would seem both numerous and diverse. In spite of this, few investigations relating to direct manage-

ment of ORVs were found. A notable exception was an evaluation of snowmobile controls tested in various parts of the snowbelt; this was presented in the Proceedings of the 1970 International Snowmobile Conference held in Duluth (Minnesota Department of Economic Development, p. 113-150). Unfortunately that document was unavailable at the time of this report's preparation.

Conceptually, five major types of management techniques or controls may be visualized: judicial decisions, legislative directives, executive directives, agency regulations, and specific management techniques.

The courts have recently entered the picture through suits such as the challenge of ORV regulations promulgated by the U. S. Bureau of Land Management. As a result of that suit, the regulations were rescinded by the court, and the Bureau must propose new regulations.

Congress has passed few laws dealing directly with the ORV situation, other than isolated instances such as the Wilderness Act (U. S. Congress, 1964a) which forbade motorized travel within the National Wilderness Preservation System, and the so-called Anti-Tote-Gote Act (U. S. Congress, 1964b) which provided for immediate U.S. Commissioner Court trials of ORV drivers invading wilderness.

Executive directives appeared with President Nixon's Executive Order 11644 (U. S. President), which recognized the need to regulate off-road vehicles and required that federal land-managing agencies promulgate appropriate regulations within a few months of passage of the Order.

Direction by agency administrators followed with separate off-road vehicle regulations promulgated by the Department of the Interior, Department of Agriculture, and Department of Defense.

Many state legislatures have passed regulatory legislation covering ORVs; details were discussed earlier in the section on Legislation.

Most of the specific suggestions for management techniques have come directly from managers rather than through research aimed directly at optimizing management. Favored measures have included more education of ORV operators, special zones for ORV use, more ORV areas and trails, improved design of areas and trails, and self-regulation by ORV operator groups.

Generalized research on management techniques will often be difficult to design. This is because many problems facing ORV managers today and in the forseeable future are unique to a particular decision-making locality; they are situation-specific. In many instances, optimal solutions will depend primarily upon the manager's creativity and innovative abilities in searching for answers, as well as his aptitude at defining problems rather than treating symptoms.

The major importance of management objectives in constraining or suggesting alternatives for problem resolution has been well identified in wildland recreation literature. For example, an explicit statement of management objectives can permit specification of the amount of ecological change permitted within an ORV use context.

The manager must also consider the ability of the resource to withstand

impacts initiated by the presence and use patterns of ORVs. Some areas may require "site hardening" techniques similar to those used in many campgrounds and picnic sites. Managers will need to predict the nature of impacts expected at a given use level and intensity, and determine what techniques, if any, are required for mitigation.

In addition, managers will need to assess the behavior of the ORV operator himself. What are the expectations, preferences, and use patterns of the visitor? What type of vehicle is being used? Where is the site in respect to the user's residence? What expectations do users hold in terms of freedom in use of their machines?

Traditionally, wildland managers have responded to recreation problems through the construction of facilities--campgrounds, restrooms, boat ramps, trails, etc. The focus will probably continue in that direction. Thus, the ORV manager may find himself continually involved in planning, developing, and maintaining facilities to manipulate ORV opportunities. Trails, roads, campgrounds, sewage systems, signs and more are all facilities the manager may use as techniques to solve ORV-related problems.

Of increasing significance in the repertoire of techniques available are programs directed at securing greater levels of visitor satisfaction, and changes in user activities so as to reduce resource degradation and depreciative behavior.

In conclusion, given a certain situation and identified constraints (e.g. management objectives, ecological capacities, and ORV user behavior), the manager has available a kit of tools (facilities, visitor management, and landscape modification) which he may apply to solve those problems facing him. Rarely will one technique be completely effective in resolving the difference between the existing and the desired situation. The mix of tools selected by the manager will be a function of situational constraints, the manager's creative abilities, and his estimation of the effectiveness of each technique to achieve accepted management goals.

SUGGESTIONS FOR RESEARCH

In reviewing the relevant literature on off-road vehicles, the authors identified many researchable questions. It was beyond the scope of this paper to list these questions in any manner of priority; readers interested in such a prioritized array are referred to McCool and Roggenbuck. The several questions below are selected as representative of current researchable ORV-related problems.

1. What planning and management techniques would reduce or avoid conflicts (a) among ORV users, (b) between ORV users and other land users and, (c) between ORV users and land managers?

2. What are the differential effects of specified types and weights of ORVs on erosion and water quality under different specified conditions of soil type, soil moisture, soil density, surface slope, and vegetative cover?

3. What is the effect of ORVs on animals during periods of breeding and early growth?

4. What design standards for both trails and ORVs could be adopted to reduce ORV impact?

5. What are the similarities and differences in terms of resource and facility needs among the various types of ORVs?

6. Of what relative importance and/or value to the "ORV experience" are (a) natural resources and (b) facilities?

7. To what extent will a substantial reduction in vehicular noise levels be effective in reducing animosity toward ORV use?

8. What are the similarities and differences in characteristics of use among families, organized groups, and individuals?

9. How does age, experience, and type of ORV influence rider expectations?

10. Does ORV operation substitute for other activities, and vice versa? If so, what are those activities? Can they be used to supplement ORV areas or serve as alternative uses?

11. What techniques can be used to more effectively communicate among ORV users, non-users, and managers?

12. What non-ORV recreation activities can safely occur on trails and areas which are simultaneously being used by ORVs?

13. What are the circumstances under which accidents involving ORVs are most likely to occur?

14. How can land managers most effectively enforce ORV regulations regarding land closures and restrictions?

15. What criteria should be used to determine which areas receive priority for development of ORV areas?

16. What are the professional and personal characteristics of those managers who are most effective in dealing with ORV problems?

17. What causes some ORV users to heavily damage the land, to create social conflicts and to violate regulations?

Because most ORV research has concerned snowmobiles, it is important that future research emphasize other ORVs so that managers can deal more effectively with problems induced by this challenging recreational activity.

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THE LITERATURE OF PLANNING AND MANAGING INTENSIVELY DEVELOPED NATURAL RESOURCE RECREATION SITES

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Abstract.--Literature applying to planning and managing developed recreation sites has been classified by type of decision to which it applies, by whether or not it is the result of research, and by degree of applicability. This classification system is intended to assist managers and planners in assessing and applying knowledge contained in the literature. When applied to 130 publications, the classification system revealed that almost 50 percent of the literature deals with maintenance problems and related information. Other areas apparently require additional research attention.

Additional keywords: Forest recreation sites, site design, campgrounds, research utilization, research priorities, management objectives.

Recent work by a task force which was asked to examine the problems and priorities for research on problems related to recreational use of forest resources in the southern states, indicates that the physical and biological impacts of use on developed sites is still a major concern of forest managers and scientists.[2/] A sample of 186 forest recreation managers and administrators and 40 forest recreation scientists in the southern states rated physical and biological impacts fourth among 22 problems identified as important. This finding has particular significance when viewed in the light of recent discouragement of research on this subject area by research administrators, funding agencies, and some scientists. Perhaps a reevaluation of this apparent redirection of recreation research is needed.

It is highly likely that the above rating would be substantiated in other regions of the United States. Continued and often heavy use of the limited number of developed forest recreation sites (primarily campgrounds) continues to pose management problems which result in high costs of maintenance and operation. Sure means for reducing these costs are yet to be found even though a fairly large body of literature is available which deals with establishment and maintenance of developed sites. One of the reasons for the persistence of recreation use impacts as a major problem with developed site recreation is the apparent absence of use of the available literature to any appreciable extent.

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[2/]Task Force Report: Forest Resources Research Needs for the Southern Region, June, 1974.

The purposes of this paper are to provide an overview of the state of the art and to develop a decision-making framework which should prove useful in applying the published literature to developed-site establishment and maintenance decisions. A beginning effort is presented at classifying the literature, assembled through a rather comprehensive search, according to applicability to the various categories of decisions which planners and managers must make. There is the likelihood that some published reports have been overlooked in the search process. However, over 200 publications have been assembled and reviewed, and close to 130 of these were applicable to the developed-site management problem.

THE PUBLISHED STATE OF THE ART[3/]

Literature published on the subject of recreation site development and management is quite extensive and in many cases relatively easy to obtain. Yet there is little evidence to suggest that it is being used to any significant extent. Many reasons are likely for this, but the most obvious are the lack of generality of the findings, lack of knowledge that the literature exists, and absence of time or interest by planners and managers for obtaining and reading the published material.

James noted that many of the problems and decisions which managers face are specific to a place and situation. At the same time, the research available through the literature is very specific. Much of it boils down to case-history status. Lack of generality of published research findings means that information is available on many fewer of the factors relevant to specific decisions which managers must make. Therefore, while a particular study may produce results very useful to management of a specific site, it can be of limited or seemingly no use in other management situations.

But when viewed in its entirety, a wealth of information is available in the existing literature. It is unfortunate that it has never been synthesized with emphasis placed on the generality of the information contained. James indicated that four basic subject areas have been reasonably well discussed. These include (1) soils and soils relationships; (2) site planning and design; (3) site vegetation management; and (4) policy, regulatory, and educational matters.

The state of knowledge with respect to soils and soils relationships is at the highest level among the above four subject areas. Soils can now be identified and classified quite accurately. Relatively complete knowledge exists concerning the suitableness of different soils for various forms and intensities of recreational uses. A dominant reason for the problem of

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[3/] This assessment of the state of the art is based in part on the paper entitled "Physical Site Management" prepared by George A. James for the Outdoor Recreation Research Applications Workshop held by the USDA Forest Service at Marquette, Michigan, June 19-21, 1973. Due to the recentness of this paper, a repeat of evaluation of the published literature was unnecessary.

excessive recreation site wear and resultant costs has been the absence of attention to soils. Soils surveys are far enough advanced that very direct information is obtained from them to aid in site-selection, design, and maintenance decisions.

A relatively large amount of literature also has been written which deals with site planning and design. Much of this literature, however, represents the sharing of specific individuals' experiences and/or philosophies and the smaller proportion is based on specific research findings. The research which has been done, however, whether descriptive or experimental, does provide some very good and often generalizable information. For example, Lime[4/] pointed out that research has provided the following information:

a. placement of tables, fireplaces, wells, water hookups, etc., significantly affect site deterioration

b. the hardened surface of the residence space in a site must be large enough to accommodate large tents, multiple tents or trailers, and the multitude of equipment which campers often bring

c. channeling pedestrian or vehicular traffic can substantially reduce site deterioration.

Management of developed site vegetation also has received substantial attention by recreation scientists and other writers. In addition to this, considerable information is available from horticulturists and others. Studies have focused on identification of "durable" vegetation; effects of uncontrolled recreation use; fertilization, watering or other cultural treatments; reasons for abuse of vegetation by recreationists; and on replanting to replace dying or dead vegetation. Proper selection and maintenance of vegetation in the planning phase of recreation site development will eliminate or substantially reduce some of the costly corrective maintenance that will likely be necessary in the long run.

The evaluation of literature dealing with policy, regulatory and educational matters is somewhat less promising than literature applying to the other subject areas. Some scattered research exists pertaining to the effects of signing or other communication devises on behavior and site impact, but the information generated is relatively scattered and lacks unity of purpose. But the increasing emphasis on behavioral research assures us that more is to come and that the information to be provided will likely be more general than much of the previous recreation research has been.

[4/] David L. Lime, "Locating and Designing Campgrounds to Provide a Full Range of Camping Opportunities," in Outdoor Recreation Research: Applying the Results, North Central Experiment Station, USDA Forest Service, General Technical Report NC-9, 1973.

The remainder of this paper is devoted primarily to development of a means for reducing the cost of information retrieval from the literature already available. Realizing that perhaps the most valuable (and thus limiting) resource that a planning or management decision-maker has is his time, it becomes obvious that an easier way is needed for identifying the most relevant literature for a particular problem. In the following pages, planning and managing developed recreation sites is viewed in light of the decisions which must be made. Furthermore, these decisions are viewed as critical to the process of establishing and operating developed sites to the extent that they affect the total costs (current and future, direct and indirect) of supplying this type of recreation service. Minimizing the total costs encountered pursuant to accomplishing predetermined public-use objectives for developed recreation sites is identified as one of the dominant management goals.

A MANAGEMENT GOAL IS COST MINIMIZATION

Most of the emphasis in this paper is on the steps and decisions concerned with recreation site development and maintenance after the public-use objective has been defined. This does not, however, preclude consideration of alternative public use objectives as determinants of total development and operation costs. It is evident that decisions which concern such things as amount, type, and seasonality of public recreation use set the stage for all subsequent decisions and options which the site planner and manager may consider.

Ultimately, the objective for which a site is developed and managed is maximization of the total recreational benefit derivable from the opportunities being provided. This, of course, assumes that the total cost to society of providing these opportunities will not exceed the value of the benefits. In many cases, site planners and designers and management personnel become involved with supply of developed-site recreation after the objective has been defined. At this point, the objective is predetermined, and their focus narrows to accomplishment of two basic, related goals:

(1) sustain the predetermined quality level of experience defined by the objective

(2) <u>minimize the cost of development, operation, and maintenance of the recreation site</u>.

It is the latter of these two goals to which managers usually give the most recognizable attention and with which most of the literature on recreation site design, management, and maintenance has implicitly dealt.

Consideration in this paper of the step of setting or defining public use objectives for developed recreation sites is not in the context of cost minimization. Rather, definition of objectives is considered as it affects the <u>general level</u> of costs to be involved and as it limites or restricts the range of options which may be considered in decision-making relevant to

implementing objectives. All subsequent steps involved in the provision of developed-site recreation services, however, are considered from the cost-minimization standpoint.

Development, operation and maintenance costs should be expressed on a per-unit-of-use basis and as present value of all costs discounted over the expected life of site use. Expression of cost in this manner, rather than as a lump sum without regard to units of use, is necessary so that development and operation alternatives can be compared without confounding cost values with the differential effect which these alternatives may have on amount of participation.

Research and other, more general literature has rarely addressed cost minimization as a developed-site management goal. This fact points dramatically to the direction which future research in this problem area should take. Costs must be explicitly recognized and measured, and the factors which affect costs and the manner by which costs are affected must be identified. Existing literature has taken a much more indirect approach.

In developing the decision-making framework for developed-site management and in examining applicable literature, an effort is made to recognize the important decisions necessary at each step of the site establishment/development process and to recognize factors relevant to these decisions. By so doing, it is possible to structure the literature according to applicability to decision-making aimed at minimizing the cost of achieving management objectives for developed site recreation.

THE PROCESS OF ESTABLISHING AND OPERATING DEVELOPED SITES

Including definition of the public use objective(s), there are four basic steps involved in establishing and operating a developed site:

1. Definition of public-use objective(s)
2. Site development planning
3. Site construction
4. Site operation and maintenance.

At each of these steps, a distinct set of decisions is necessary, each requiring costly information describing a critical set of factors which affect the outcome of a decision at its implementation. More specifically, the factors at each decision "level" and the manner by which they are taken into account determine the direct costs of implementing a decision concerning either site development or operation. In addition, the accuracy, completeness, and degree of utilization of available information affect the level of secondary or indirect costs which can be of a long-term nature and which can impact areas or environments other than the developed site itself.

For example, a decision to locate a developed water site on moderately steep slopes so that users can be near the shoreline will have a direct impact on cost of construction (greater terrain modification necessary) and maintenance (increased foot wear on side slopes, greater use overall because of nearness to water, and more soil movement). This set of conditions also is likely to result in secondary costs such as sedimentation in the lake and muddying of the swimming beach. Furthermore, the condition of the site may well deteriorate to a state that maintenance expenditures are no longer reasonable and abandonment of the site and development of a new one become necessary.

In the remainder of this section of the paper, steps in the process of establishing and operating a developed recreation site in a natural setting are considered from the standpoint of the decisions which must be made at each step. The step of defining the public-use management objectives is examined for its effects on the general level of costs and as it affects subsequent decision-making. The remaining steps are discussed from the standpoint of current and future costs of site development and operation which result from choices among alternative courses of action directed toward implementation of defined objectives.

Step 1

Involved with defining public use objectives are four cost-affecting decisions:

a. Amount and type of use
b. Clientele to be served
c. Scale of development
d. "Naturalness" desired.

The first two decisions are closely related, yet they are distinct enough to be given separate consideration. In the assessment of demand for developed-site recreation, information will have been generated indicating the amount of use and type of activities which the public is currently demanding. If reliable information is available, the decisions concerning which activities to provide, the relative emphasis on each, and the amount of use to anticipate are evident. Under realistic conditions, however, specific demand information is not available, and decisions must be made with limited information on current demand and on expected future changes in demand.

Alternative decisions concerning either the activities for which the site will be established or the relative amounts of use by each activity can lead to widely different development and maintenance costs. Misjudgments at this step can lead to extreme under- or over-utilization of the site, or they can lead to uses for which the site is not intended or designed. The cost implications of such misjudgments can be quite serious, and definition of the public recreation use objective of a site development project is a crucial decision affecting all subsequent steps.

Clear recognition of the clientele to be served is equally important to identifying the objective. Whether or not the primary clientele are transient, extended-stay, or day users has an overriding influence on site location, scale and intensiveness of development, maintenance schedules, and use seasons. Also, whether the clientele is principally local or non-local has influence on use-control policies, fee structure, and site location.

Scale of development should also be a major consideration in defining the objective and will affect the per-unit cost of development and operation/maintenance. One large site or several smaller ones are alternatives to be compared. Sites can purposely be made larger than currently needed so that expected future increases in utilization can be accommodated, or so that use pressures can be distributed among different parts of the site at different times.

Along with the above decisions, a clear statement in the objective of degree of "naturalness" in the environment to be created should be made. Costs are directly related to this decision but generally in opposite directions depending on whether establishment or operation/maintenance costs are the focus of attention. Establishment costs are, for the most part, inversely related to naturalness in that much less site modification and facility emplacement are needed. Maintenance costs, however, are likely to be greater if more natural appearance is desired. Heavy use of most sites takes a heavy toll on their "naturalness," and many times frequent and very costly preventive as well as corrective maintenance measures are necessary.

In summary, the public-use objective of a developed site essentially sets the stage for subsequent decisions, costs, and problems. Correct decisions at this step may make the greatest contribution toward cost minimization.

Step 2

Decisions involved with planning site development are guided by the public-use objectives, yet there are many options available at this step. The specification of a plan has a very direct bearing on the costs of establishing the site and on all subsequent costs of operation and maintenance. The general decisions which must be made include:

a. General site location

b. Specific location of site boundaries, units, and service facilities

c. Placement of facilities on individual units

d. Facilities design and materials selection

e. Species, size, and location of vegetative cover.

Decision-making at this step is complex and must be based on accurate information concerning relevant factors and factor interactions.

Selection of general location affects costs because of its relationship to expected levels and kinds of use, to competition with other land uses, and to other recreation opportunities or attractions in the geographic area. Specific factors to consider include location of population centers and major access routes, kind and intensity of surrounding land uses, climate and season lengths, location of unique attractions (scenic or historic), availability of consumable water and space, and availability of resources to support off-site activities complementary to the on-site activities. Also to be considered is availability of support services such as stores, sewage treatment, service stations, and management personnel. All of these factors affect travel patterns of users; type and number of service facilities which must be provided; and as stated previously, the level, type, and periodicity of use.

Upon selection of the general site location, the next decision involves exact definition of the site boundaries and the arrangement and spacing of the units and service facilities. Boundaries must be established consistent with the public-use objective and with explicit consideration to internal site characteristics are in turn a function of boundary placement. Soils, slope, overstory and understory vegetation (age, composition, vigor, size), leaf litter depth, elevations of various locations, and existence of unique features all should be considered in boundary placement because of their relevance to unit and facility arrangement and spacing. After boundary establishment, or simultaneously with it, unit and facility placement must be decided, and this will involve additional factors. Included should be local drainage patterns, desired relationships among different anticipated recreational activities, availability of scenic view, desired "common" space, ground water flows, and local wildlife populations. Each of these factors will assume different importance depending on the objective(s). If it specifies a relatively natural environment, then considerable care must be exercised to preserve much of the ecological balance and biotic forms. If less "naturalness" is desired, much less emphasis need be placed on location of units and facilities to make them unobtrusive to the natural system functions. More site modification and planned density will be acceptable in these cases.

Placement of individual unit facilities poses a different set of questions and draws focus on the micro-site factors. The most recognized individual unit is the family camping unit. Facilities usually involve a table, parking space, hookups, and residence and utility space. Micro-site factors affecting placement of these facilities include individual tree locations, slope placement of surrounding units, rock outcroppings, location of internal roads, sun/shade conditions, and drainage patterns. Other factors include intended activity(ies) and clientele and proximity of the unit to support facilities.

The fourth set of decisions concerns the design of the overall service and individual unit facilities including specific attention to construction materials. Design of these facilities gives them specific appearances, directs the way they are used, and determines how much wear or abuse will be encountered. Selection of materials for construction has the same general affect and determines the kind, frequency, and intensity of maintenance and/or replacement that will be required. One of the basic trade-offs to be encountered in making these decisions involves the original cost of materials and assembly and the cost of maintaining (cleaning and repairing) facilities once they are in use.

Factors influencing design decisions should include the type, seasonality, and amount of use anticipated; the desired appearance of the site; kind and level of "conveniences" to be provided; and the availability and prices of materials. As is the case with all of the preceding decisions, factors indicated to be important cannot be considered independently but must be considered simultaneously or in sets because of their inherent interactions.

The final set of decisions relevant to planning site development covers the species, age and size, and location selections for vegetative cover on and surrounding the site. Overstory cover (existing or introduced) for shade, for production of soil organic matter, for aesthetic appearance, and for screening of view where necessary is a very important component of the total site plan. Different species of different sizes present different appearances and have different tolerances to recreation use and the consequences of that use. Age is a determinant of expected longevity of the overstory and the flowering- and fruit-bearing potential which is important to local wildlife populations. The density of overstory cover and its location not only affect apperance and function of the site, but it also determines use patterns and circulation.

Costs associated with understory vegetation (including ground-level vegetation) depend on overstory conditions, species selection and soil conditions. Maintenance of ground cover vegetation can be eliminated by introducing gravel or pavement coverings. But on some sites this would be inconsistent with objectives. In these cases, selection of species, arrangement of facilities, and competition with other understory and overstory vegetation must be evaluated. Understory cover between 3 and 10-feet above ground level provides screening between units and facilities. Where this is desired, multifunctional species acting as wildlife food, flowering shrubs, traffic barriers, and screens can be selected.

Decisions, as discussed above concerning the planning of intensive-use recreation site development, involve a very large number of factors related to geographic location, on-site characteristics, and intended function or use. Many planners and managers have developed skills through practice which enable them to implicitly or explicitly evaluate these factors

and their interactions in the planning and design of the site to meet predetermined objectives. Others have either limited or no experience base upon which to base their decisions, and these people will learn how to take proper account of the important factors only by making very costly mistakes. But, even though this group will learn by its mistakes, there will always be a new group entering the professional ranks which must repeat the learning-by-doing process.

Application of the site establishment and maintenance literature can especially be of benefit to this latter group. But continued research emphasizing the full cost implications of site planning decisions will benefit both groups. It is unlikely that even the most experienced professional can be aware of the total cost consequences of the alternative courses of action he has available to him. In this light, research directed toward developing establishment and operation cost functions for sites with various objectives and involving different conditions can be among the more practical and efficient research which recreation scientists may accomplish.

Step 3

At completion of the site development plan the planner/designer, with inputs from management personnel, must supervise implementation of the plan during the construction phase. Decision-making at this step basically involves

a. Sequencing of construction process

b. Technology, labor, and equipment selection and management.

Of all the steps in the site establishment and operation process, site construction and associated costs seem to least fit the conception of a researchable problem. The principal reason for this is that many of the factors which affect construction costs are exogenous to the decision-maker. Available technology, prices, and supplies of materials; availability of skilled and professional personnel; and many other factors are not directly controllable by the planner/construction supervisor. This is especially true if construction is accomplished through contract with an independent construction firm. In this case, even the sequencing of construction steps or phases is partially exogenous.

Because of the general "non-researchableness" of the construction step and the resultant costs and cost determining factors, little attention is or even perhaps should be devoted to them in this paper. It is important, however, to recognize that construction costs can be controlled and that decisions at this step are very important. Most of the information to be used in making construction-specific decisions of necessity will be of local relevance and will consist mostly of the planner's knowledge of local market conditions and materials' availability. More general information should relate to construction technology including data on new machinery and equipment. Although the supply of this information is not a likely role for researchers, it should be made widely available in the form of published documents or other means.

Step 4

Operation and maintenance is the final step in the overall process of providing developed-site recreation opportunities. Like Step 2, which involved planning the site development, there are crucial decisions at this step which have both short-run and long-run cost consequences. The basic decisions include:

1. Policies and control techniques affecting use
2. Maintenance practices
3. Public relations activities
4. Selection and supervision of management personnel.

Policies defined and techniques used to control the way developed sites are used must be synchronized with the decisions made concerning site development. Even the best site plans can be practically nullified if they are not followed with use control techniques administered according to use management policies consistent with the site objectives. Site selection and design will act to direct patterns, types, and intensities of use, but "planned" recreationists' behavior can be substantially modified by use control or management policies and techniques which are inconsistent with the objectives.

For example, many campgrounds are designed for family camping use and are located so as to be accessible to family campers. But these sites may be attractive also to non-family groups whose actions and behavior may greatly conflict with family campers. Such groups can create noise and other undesirable situations which eventually may result in little use of the site by families and in use patterns which seriously impact the site and alter its appearance. Site design and location must be complemented in these situations with adequate policies and techniques which assure achievement of the public-use objectives.

Some of the considerations important in implementing use control include length and timing of season, permitted off-season use, and allowed length of stay by individual parties. Decisions involving these factors may substantially alter the maintenance and operation costs. Other important factors are the fee level, visibility of official personnel, strictness of rules enforcement, and registration procedure or requirement. These affect amount, timing, and types of use and behavior. Because the bodily presence of the recreationists themselves is only a portion of the cause of site impact and resultant costs, the way vehicles and equipment are used must also be considered. Parking of vehicles, use of secondary vehicles such as minibikes, and use of camping equipment (lanterns, tent floors, axes) can especially impact the health and appearance of overstory and understory vegetation and can dramatically alter soil structure and composition.

The second set of decisions in the operation phase of developed-site recreation involves maintenance practices. The manner and intensity by which maintenance is carried out represent costs in themselves. It could be argued that the most effective way to minimize site operation costs is to minimize maintenance expenditures. In fact, this approach seems to be a reality among some management interests. But lack of adequate and timely maintenance may create many more problems and costs than it saves. Site managers have found in most cases that maintenance, following the philosophy that "a stitch in time saves nine," is the most effective approach. Maintenance activities including watering and fertilization of vegetation, soil cultivation, overstory density control, mulching, facilities servicing and repair, and others have a direct impact on a developed site's "health." Maintenance can include vegetation replacement or relocation of facilities to reduce accumulated site wear. Maintenance activity, of course, depends on budget, equipment and personnel availability, but it also depends on the expertise of the site manager(s).

Activities aimed at projecting a particular image of the agency or site or at creating good rapport with clientele and others also may affect operating costs to a very large degree. Signing, advertising (promoting), interpretation programs, and general visitor information services represent means for communicating with users and the local population. What is or is not communicated sets the stage for the kind of use and users and the attitude or knowledgeability persons have of the effects humans can have on a natural environment. This seems particularly true where vandalism is a problem, and in many cases good rapport with local residents seems directly related to absence of a vandalism problem. The personal appearance and attitude of agency representatives who work on the site may be one of the more important factors deciding agency image and rapport.

In this and other respects, selection and supervision of management personnel is extremely important. An effective site operation/management job must depend on the education, in-service training, experience, and other qualities of personnel. Research has done relatively little in this area or in evaluating the effectiveness of supervision. Certainly the amount and kind of supervision given to management personnel is going to affect the level and quality of operation activities and is thus an important determinant of the cost of supplying developed-site recreation opportunity.

APPLICATION OF LITERATURE TO DECISION-MAKING

As a stimulus for its application in arriving at planning and management decisions as discussed in the preceding section, published reports reviewed for this paper have been classified by the step and decision set in site establishment and management to which each applies. These steps and decisions are reviewed below in model form (fig. 1). In some cases, information contained in an article applies to more than one of the steps or decisions. These are listed in more than one place. Literature entries have also been classified on the basis of directness of application, of being a report of research results, and of being an application of general knowledge or philosophy.

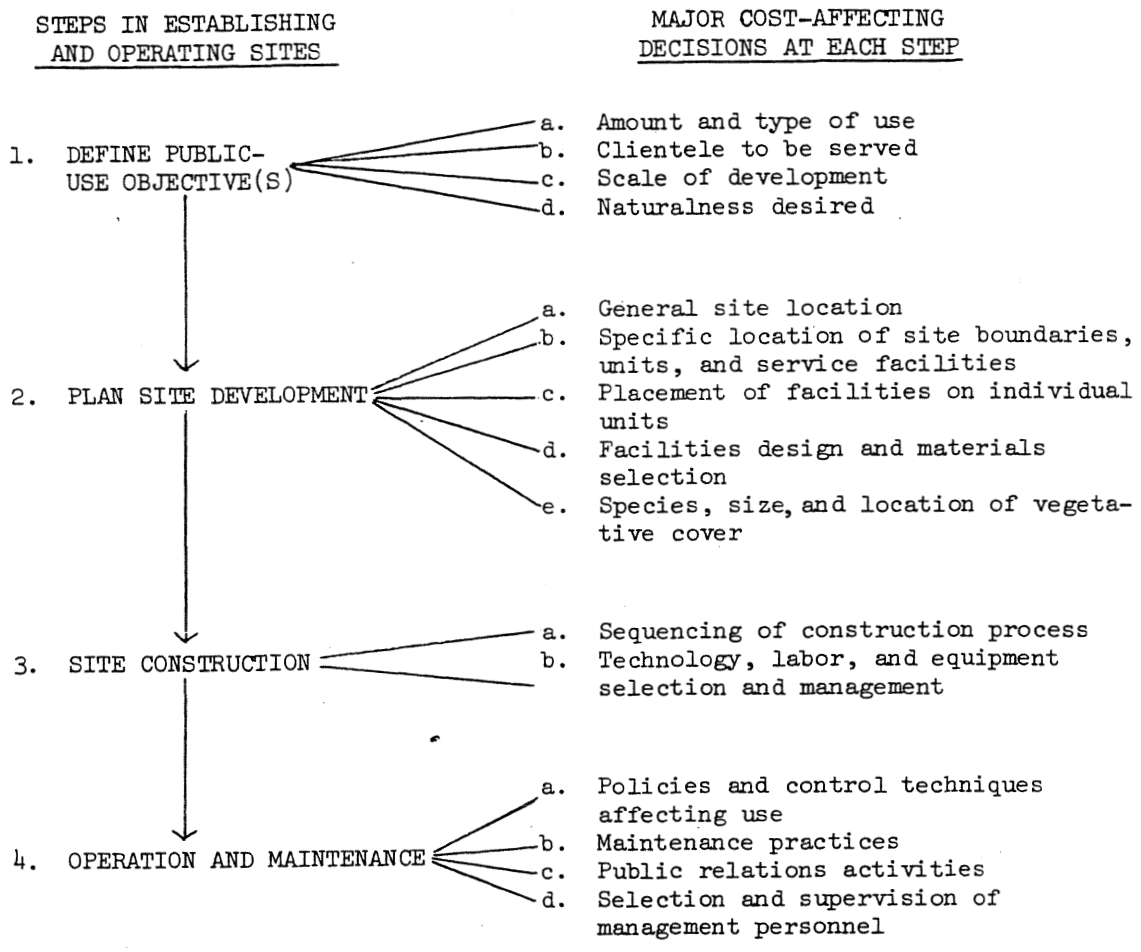

Figure 1.--Model of decision-making for establishing and operating developed recreation sites.

In the model in fig. 1, steps in establishing and operating sites developed for recreation are numbered as are the cost-affecting decisions (sets) within each step, which are given letter codes. These codes are repeated in succeeding table 1.

In table 1, the right-most column shows the code and description of each decision set except for the decisions involving the construction step of the site development process. This step is not considered for literature classification because of its general non-applicability as a research problem and because of the almost total lack of relevant literature.

Numbers within columns 2, 3, and 4 indicate the numbered order of individual literature entries in the "Listing of Reviewed Literature." Articles are arranged alphabetically, and the last line of each entry in the "Listing" provides information on general source of the information contained as well as the step/decision codes shown in the "Model of Decision-Making." The information source is shown by the first two or four letters in the last line of the entry and refer to the following codes:

RD = Descriptive Research, a report dealing with data collected to describe a problem or situation

RS = Solution-Oriented Research, a report describing a study of means to solve a site development or operation problem

AG = Application of General technical or experience-based knowledge to developed recreation site management or planning

PD = Problem Definition, a discussion or exposition of a development or operation-related problem

UP = User Preferences, an examination of the preferences of users of developed recreation sites

RM = Research Methods, a description or evaluation of a technique or tool for collecting data relevant to developed site establishment or operation

O = Other literature.

The table of literature classification is intended for use by instructors and extension personnel and by planners and managers who are seeking answers or ideas concerning a particular decision within the site development and operation process. It must be emphasized that this is not a complete listing of literature but is a listing of the most available literature. State documents, unpublished reports, theses and dissertations, and some other sources of literature will be examined for inclusion as this work advances. No attempt is made either to provide a comprehensive inventory of literature relevant to defining public-use objectives. As stated at the beginning, this particular step is considered to be beyond the scope of this paper. It is included in the classification table, however, because some of the literature applicable to site planning and operation also applies to definition of objectives.

Table 1.--Classification of research and other literature by degree of applicability to decision-making[a/]

Steps and decision sets	Directly applicable literature		Secondarily applicable literature
1. Define Public-Use Objectives	(Research)	(Nonresearch)	
a. Amount and type of use (1.a)	5 122	121	12 59 125 30 62 38 64 42 92 47 113 49
b. Clientele to be served (1.b)	5	91	36 47 117
c. Scale of development (1.c)	66 130		14 41
d. Naturalness desired (1.d)	50 83	42 121	9 49 108 122 12 64 111 125 36 66 113 129 43 93 116
2. Plan Site Development			
a. General site location (2.a)	5 27 32 63 70	21 25 85 98 114	18 49 96 130 28 60 111 44 65 115 45 66 124 48 91 128
b. Specific location of site boundaries, units, and service facilities (2.b)	15 124 18 130 20 63 69	10 128 22 25 94 110	7 38 54 68 84 100 13 41 55 75 93 104 23 46 60 78 95 107 28 52 62 81 97 108 36 53 65 82 98
c. Placement of facilities on individual units (2.c)	8 18 20 63	25 65 94	5 22 82 110 7 52 83 126 10 53 100 13 78 107

Table 1.--(continued)

	(Research)	(Nonresearch)	
d. Facilities design and materials selection (2.d)	14 63 86	4 25 127	2 18 93 116
e. Species, size, and location of vegetative cover (2.e)	3 29 57 18 50 63 19 51 75 20 52 79 100 105 120	24 104 73 126 95 99	9 56 102 11 61 107 13 77 110 41 82 118 53 88 123 55 96
3. Site Construction	Not Applicable	Not Applicable	Not Applicable
4. Operation and Maintenance a. Policies and control techniques affecting use (4.a)	14 16 37 58 71 80 122	9 67 102 115 125	4 62 13 64 29 84 38 96 42 107 48 113 53 117
b. Maintenance practices (4.b)	6 18 46 7 19 61 8 32 79 17 37 105	4 35 73 99 22 40 78 102 25 53 87 104 31 72 88 126 127	2 23 52 69 81 103 118 3 29 54 74 82 106 120 10 33 56 75 90 110 128 13 34 57 76 95 112 15 39 68 77 101 115
c. Public relations activities (4.c)	71 123	89	4 49 66 107 125 6 58 67 113 16 62 82 115 47 64 83 122
d. Selection and supervision of management personnel (4.d)		26	

[a] Numbers within this table refer to the numbered articles in the References section.

In reviewing literature related to a particular decision problem, it is suggested that articles classified as "directly applicable" be sought first. In addition, the directly applicable literature is subdivided into "research" and "non-research" categories. It is suggested that the research literature be given higher priority than the non-research literature. Useful information and ideas are contained in all the listed articles, however, and secondarily-applicable literature should be given attention also.

FURTHER RESEARCH AND LITERATURE APPLICATION WORK NEEDED

A very large amount of information is contained in the many published works which deal with recreation site development and operation. Classifying existing literature according to specific decision sets should promote more use of the information within. But at the same time it points out gaps or voids where little has been written and especially where researchers have not ventured. The table of classification shown on preceding pages indicates that most of the attention has been given to maintenance practices or methods. Almost 50 percent of all the published articles reviewed for this paper, and more specifically 20 percent of the research articles, deal with maintenance-related problems and related information. Next greatest attention (about 30 percent of the articles) is on the location of site boundaries, units, and service facilities. The third-ranking decision set concerns species, size and location of on-site vegetative cover.

Measured in terms of percentage of research articles, however, a different picture is presented in that almost one-fourth of the published research results deals with on-site vegetation. The biological-educational background of many of the recreation scientists (especially during the 1960's) explains much of this emphasis. Notably lacking in the literature is research emphasis on decisions involving (1) general site location, (2) placement or arrangement of facilities on individual user units within the site, (3) design and materials selection for site facilities, (4) policies and control techniques affecting amount, type, and periodicity of recreation use, (5) the effectiveness and impact of public relations activities, and (6) selection and supervision of management personnel.

Future research dealing with developed sites should give explicit recognition to the cost implications of alternative courses of action in the establishment and operation process and particularly to the six areas listed above. Given a predetermined budget and objective, planners and managers need information directly relevant to minimizing the cost of providing developed site opportunity so that maximum output can be realized for each dollar of expenditure. Development of explicit cost functions are thus called for. A serious limitation on this research has been the availability of cost data. But the impact of this limitation can be reduced by greater efforts and willingness on the part of planners and managers to keep detailed cost data through improved cost accounting procedures. Therefore, the research needed concerns development of comprehensive cost functions which will enable better prediction of the consequences of alternative courses of action and better evaluation of their

effectiveness. Research administrators and funding agencies should discourage further attempts to describe the problem. Descriptive studies have already adequately exposed its seriousness. Our emphasis needs to be on solution-oriented research and particularly on studies which examine the costs of alternative solutions.

Further encouragement of application of existing literature is also needed. A great deal of knowledge implicitly addressing the costs and benefits of alternative courses of developmental and operational actions is already available. But a more effective system for disseminating this information is required if it is to be utilized. The next step of the classification process started here should be to examine what the literature has to offer concerning specific information needed for making "good" judgments concerning each of the decisions earlier identified. Planned work in this area will involve classification with respect to decision application of each finding, conclusion, or implication in available reports (published and unpublished) as they relate specifically to a needed bit of information. Automatic data processing will be required for such a system, and this will enable rapid retrieval of information in response to a quite specific request.

Such a system may have its greatest impact on future research because it will focus attention on what we do not know as well as on what we do know. It will also encourage much more specific research rather than general research which addresses no specific problem. Many of the papers reviewed had application to three or four different categories of decisions, and as a result the information was usually incomplete for any one category. More specifically focused research and research reports should greatly enhance their use and applicability.

LISTING OF REVIEWED LITERATURE[5/]

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(0)

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5/ The letter and number coding below each cited publication refers to the literature categories and level of decision within the "Model of Decision-Making". For example, the coding below article number 2 by Barton is (PD--2.d.2/4.b.2). PD refers to the "Problem Definition" category and 2.d.2 and 4.b.2 refer to decisions 2.d and 4.b in the Model. The 2 at the end of each of these codes refers to the level of applicability of the literature. A 1 indicates direct applicability and a 2 indicates indirect or secondary applicability.

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