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Information Needs for River Recreation Planning and Management

Perry J. Brown
University of Montana - Missoula, perry.brown@umontana.edu

INFORMATION NEEDS FOR RIVER RECREATION PLANNING AND MANAGEMENT

Perry J. Brown, *Associate Professor*
Colorado State University
Fort Collins, Colorado

ABSTRACT.--Information inputs to making decisions about recreational use of rivers are described. Major recreational decisions and possible inputs to them are identified. A future scenario for recreational use of rivers is given and the needed research on information inputs is identified within the context of the scenario.

So much planning and management information is being generated by river researchers and managers that to discuss information needs seems redundant. However, there appears to be a lack of focus and organization to present efforts and in that context the discussion might be productive. River recreation research seems to be going the way of most other recreation research--ignore all we have learned about recreation, start from scratch, and piddle for 5 years (or more) before we define the problem.

My own view of the future suggests that we cannot afford less than a focused, coordinated research effort right now. We need to determine the nature of the phenomenon and then seek the information that will allow us to manage it. In this regard, there is a tremendous cooperative role to be played by river managers and researchers. There is the opportunity to learn from past recreation research and to proceed with rivers research more effectively and efficiently.

Simply put, my view of the future which calls for urgency looks like this. Within the next 10 years, I see at least a doubling of demand for river recreation. This will raise issues of user conflict, user displacement, and resource damage--possibly beyond acceptable limits. Within this expanded group of enthusiasts, there will be more novices using new equipment that they do not know how to use. The result will be increased hazards and a greater public safety management program for river administrators. I see continued demand for special designations for rivers. Some of this will be for formal status within the Wild and Scenic Rivers System

(Act PL 90-542). Some will be for administrative designation as special use areas. This movement will mean more public involvement and thus need for more information about rivers and their uses. It will also mean that regional systems of rivers will need to be designated and studied so that rivers can be allocated to uses in an efficient manner; efficient because the resource is presently scarce and will become more so. One of the things to avoid is the polarization of supply into wild, primitive rivers and into high use, developed rivers. A regionally specific, systematic approach to allocation may be helpful in avoiding this problem.

Finally, my view suggests that there will be continued pressure to turn many rivers into lakes. Dams will be desired for energy production, flood control, irrigation and domestic water storage, and flat-water recreation opportunities. Planners especially will be required to respond to these demands by justifying why river recreation is important. If they are unsuccessful, we will lose our ability to meet river recreation demands and the doubling of demand will completely overwhelm the remaining resource.

What kinds of information will enable river managers to deal with the challenges posed by my scenario? The following sections describe the kinds of information which may be useful and give examples of their relevance.

INFORMATION NEEDS

Recreation management decisions might be approached several ways. One way is based

on carrying capacity. It fits the purpose here because carrying capacity is an integrating concept and because it is familiar to many river managers who have specified river capacity to regulate use.

The decision model into which carrying capacity fits has been presented elsewhere (Brown *et al.* 1976, Roggenbuck 1975) and is only briefly reviewed here. Three basic decision points are shown (in boxes) (fig. 1, Brown *et al.* 1976): (1) selecting management objectives; (2) selecting management tools and practices to achieve objectives; (3) selecting modifications to make in the management system, if needed. General information input to each of these decisions is shown; at each decision point, only new inputs to the process are shown; data are assumed to be carried from one decision point to the next. Activities, like implementation, that occur between the decision points are also shown. The performance of each of these actions often produces information useful for making subsequent decisions. Therefore, the output of each action can be considered as an information input comparable to those inputs specifically identified. For instance, the actual calculation of carrying capacity produces a number (or range of numbers) which is a standard indicating the maximum

amount of use to be achieved. This number becomes one of the many inputs to selecting management tools--one that may limit the range of alternatives considered.

While both the decisions and the intervening activities produce outputs which become inputs to the next decision or activity, our focus here is on the explicit inputs shown in figure 1; i.e., those inputs to decisions which are inputs to that process and are related to the basic decisions of the process. A somewhat more detailed listing of the relevant information inputs to selecting management objectives, calculating carrying capacity, and selecting management tools is given in the following tabulation:

SELECTING MANAGEMENT OBJECTIVES

    User Preferences
        Activities
        Resource Attributes
        Social Attributes
        Managerial Attributes
        Desired Consequences

    Resource Capabilities
        Functional Capability
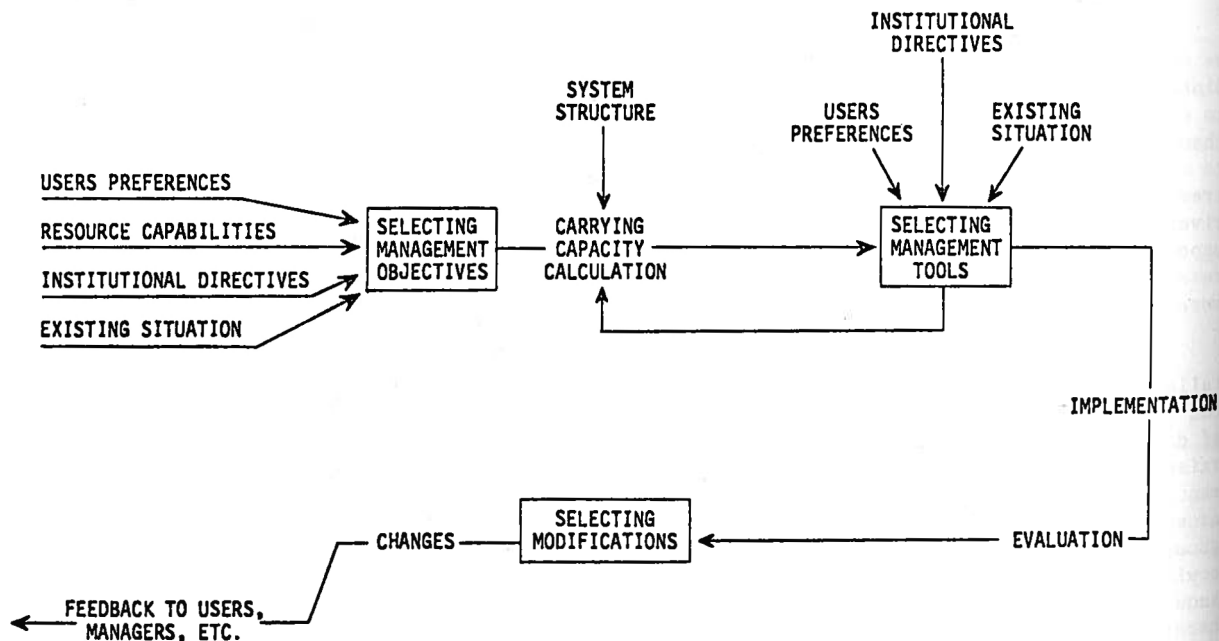   Assimilative Capacity
        Resiliency

Figure 1.--*Decision points, with their inputs and outputs, for recreational management of rivers.*

Institutional Factors
  Laws
  Administrative Policy
  Budget and Personnel

Current Situation
  User Characteristics
  Resource Condition
  Management Practices

DEFINING THE MANAGEMENT AREA STRUCTURE

Facilities

Physiographic Elements

SELECTING MANAGEMENT TOOLS

User Perception of Management Actions and
Behavior

Institutional Directives

Existing Situation

SELECTING MANAGEMENT OBJECTIVES

The kind and amount of information ac-
tually used by managers in selecting manage-
ment objectives may be very limited, or it
may be extensive. Specifying a set of in-
formation needs will not necessarily change
the kind, or amount of, external information
used, but it does indicate some of the kinds
of information useful in the "decision
calculus."

User Preferences

What users prefer for river recreation,
environments, and experiences gives clues to
the demands users have for river recreation
and the forms it should take. Such informa-
tion may indicate to managers the level of
support existing for various recreational
opportunities, the range of opportunities
desired, and the nature of the opportunities
that people seek. Preferences for several
kinds of information, including those for
activities, natural resource elements, so-
cial and managerial situations, and conse-
quences of recreational engagement, may be
considered.

Activities

User preferences for activities give a
general indication of the things users like
to do in an environment. It has been common
to identify recreation as activities and to
enumerate the activities in which people en-
gage. To prepare management objectives, it
might be useful to know what activities users
would like to have offered. It may be that
users are thinking of different sets of ac-
tivities than managers, and information about
such differences could be useful in selecting
a set of activities to be included in speci-
fic management objectives. For instance, if
users think of both rafting and hiking (at
portages or around camp) as important compo-
nents of a river excursion, the manager may
want to consider both when developing manage-
ment objectives because elements of the
physical, social, and managerial environ-
ment may be different for each activity.

Resource Attributes

One category of things that the manager
may manipulate is attributes of the resource
environment. Users also exhibit preferences
for different attributes which may facilitate
their having satisfying experiences. If man-
agers know what resource attributes are pre-
ferred by users, they will know what resource
factors are perceived by users as being im-
portant to satisfaction and may then identify
some conditions of the resource attributes to
include in management objectives.

If users indicate that maintenance of a
relatively natural environment along a river's
edge is important to their satisfaction, the
manager may then write an objective which em-
phasizes the riverside environment and what
levels of disturbance are acceptable. Like-
wise, if users indicate that an invasion of
trash fish lowers the quality of their river
fishing experience, the manager may prepare
an objective which specifies at what point
the amount of trash fish is undesirable.
These and many other resource factors have
been dealt with by managers over the years.
From the perspective of selecting management
objectives, it might be useful to determine
which of these factors are perceived by users
as being important.

Social Attributes

The social attributes of the recreation-
al situation may also influence whether or
not users have satisfying experiences. Such
items as the frequency and kinds of direct
contacts between users and such indirect
contacts as worn away vegetation and lit-
ter are important. Status-giving proper-

ties of recreational settings and experience may also be considered in this category.

Probably the most common expression of social characteristics in a management objective will be articulation of the kind, location, and amount of contacts acceptable for a quality experience. For river management, different kinds of contacts occur at the launching site, on the river, at campsites, and at takeout points. Also, the size and behavior of contacted groups may be of concern. In writing objectives, a manager might input preferences for different amounts of contact to his "decision calculus" and arrive at standards indicating either a desirable or acceptable number of contacts for a specific kind of recreation. Another condition for which users might have preference is the social status accorded certain areas and activities. Managers may be able to manipulate this status component by labeling or designating certain areas (e.g., Wild Rivers), or by advertising special opportunities or challenges (e.g., ratings of rapids). Preferences for these designations may be used by managers in writing management objectives which are designed for recreation opportunities that produce status outcomes.

Managerial Attributes

One other environmental attribute set, those of the managerial situation, may also influence the production of satisfying experiences. Management philosophy and approach, designation of area types, and the level and type of management activities (in terms of personnel and facilities) are all characteristics for which users might have preferences. For instance, in selecting management objectives it might be valuable to know how users feel about both regulatory and manipulative types of management. If users are opposed to regulation, the set of management objectives for consideration may be constrained. Alternatively, if users are indifferent to either type of management or are willing to accept either, there may be several options which the manager will want to consider.

Desired Consequences

Engagement in activities produces a set of consequences. Often these consequences are identifiable kinds of satisfactions and benefits; sometimes dissatisfaction results

from the experience. Different users appear to seek different kinds of satisfaction and these different preferences can be identified.

In writing management objectives, there may be instances when it is desirable to have information about user preferences for consequences of the experience. If users are seeking opportunities to affiliate with others, if they are seeking achievement and skill development, if they are seeking escape from everyday environments, knowledge of such desires could be useful in selecting management objectives related to user desires. While the manager actually manipulates resource, social, and managerial factors to produce opportunities to provide these kinds of satisfaction, knowledge of desired consequences may provide a rationale for selecting specific standards to be included in management objectives and subsequent management actions. For example, if the river manager knows that users desire experiences which enable them to escape both their usual environment and many other people, he might consider management objectives which include standards dealing with length of trip, size of party, number and location of contacts between parties, and type of equipment used. These and several other variables will likely influence whether or not users have a satisfying experience.

Resource Capabilities

The capabilities of the resource base to support different recreational activities and to enable production of quality experiences can be integrated into decisions about management objectives. This information may indicate which activities are physically possible, some of the resource constraints on production of recreation opportunities, and the levels at which change in the resource may become unacceptable. Three categories of information which may be considered are functional capability, assimilative capacity, and resiliency.

Functional Capability

The simple notion that a resource base provides an intrinsic opportunity for a recreational activity describes what is meant by functional capability: the resource is capable of supporting functional use. We often say that if there is a river present, there might be river recreation opportunities; if a river is not present, there is no

opportunity for river recreation. This notion does not rule out the possibility that management might alter the landscape to provide river recreation opportunities where they once did not exist. What it does indicate is that some opportunities exist without alteration or with enhancement only.

Resiliency

An idea associated with acceptable resource change, and thus acceptable levels of use, is the ability of the resource to bounce back after being stressed. Included in resiliency is not only the bouncing back of existing objects, but also regenerative ability. Specific standards may be written into management objectives regarding resiliency, particularly for soils and vegetation, but also for other resource factors.

In considering changes in vegetation, visual deterioration may be acceptable if the ability of the vegetation to recover in a specified time is maintained; if the vegetation cannot recover, the change is deemed naturally irreversible. The management activity of site rotation is based on this idea. For river recreation management, the manager might consider items like vegetation, fish, wildlife, and riverside soil conditions as fitting into this category. The ability to predict at what level or point (threshold) conditions become irreversible is not well developed, but in cases where the outcome of different use and deterioration levels is known, the manager may gain valuable information for selecting management objectives.

Laws

The laws that guide management of land and water areas may have a large influence on the kinds of management objectives selected. Laws often set the boundaries within which decisions must be made and indicate the amount and type of recreational use that is acceptable. For river management a relevant piece of legislation might be the Wild and Scenic Rivers Act (PL90-542). This legislation sets the tone for recreational use of wild, scenic, and recreational rivers managed by Federal and State agencies. It provides general guidelines for condition of the adjacent shoreline environment, water quality, river impoundment, recreational and other facility development, and river access under each of the river classifications.

Another kind of legislation important to river management is Federal and State water quality statutes. These statutes often either specify acceptable water quality standards, or provide a mechanism to establish standards which are subsequently promulgated. Standards like these might be used directly in the writing of management objectives.

Administrative Policy

Like laws, administratively established policy may guide the selection of management objectives. Administrative policy plays the same role as law, though it is often more specific by focusing on one agency's management style or on a particular area. For instance, an agency like the Bureau of Land Management may eventually articulate a Bureau-wide interpretation of the Wild and Scenic Rivers Act and put forth specific management guidelines for each class of rivers. This would encourage consistent management throughout the Bureau while at the same time constraining the range of options for management objectives and practices which any one BLM river manager may consider.

Institutional Factors

Institutional factors often act to direct the kind of management objectives written for any specific area. Statutes, administrative policy, and budget and personnel situations often direct and constrain the choice of objectives. Such information may include things like the range of opportunities for experiences which are possible, the management philosophy which is appropriate, and the degree to which management activities can be effective in meeting certain objectives.

Budget and Personnel

Information about budget and personnel may constrain the kinds of management objectives selected. These factors are often viewed as limiting the effectiveness of management, and information about them may lead to selection of realistic management objectives. For example, if personnel are unavailable to regulate river use by administering a permit or fee system and checking compliance with the system, objectives which require that intensity of management may not be selected. Likewise, objectives which require facility development for their attain-

ment may be rejected if budgets are expected to be very low or to not contain construction money.

Current Situation

Information about the current situation identifies the state of the management system. Also, the current situation may be quite constraining on future management actions because some options may have been lost through present and past management, and because some present behaviors (both user and managerial) may be quite difficult to change. For these reasons, the set of realistic future options that the manager has to consider may be limited.

User Characteristics

Changes in type or amount of use suggested by certain management objectives, if realized, may have an effect on user activities, distribution, group composition, and several other factors. Knowledge of who will be affected by changes is valuable. Also, knowledge about behaviors to be changed and an estimate of how easily the changes can be effected may be important in selecting management objectives.

One example where current user data may be valuable is a river where there are long-standing traditional uses. Present users will probably consider the traditional use as normal and a right. Efforts to modify that use would likely be fraught with public relations problems, and benefits accruing from the change may be far less than the costs. In a case of this nature, the manager may rule out consideration of some objectives.

Resource Condition

Present resource conditions may influence the writing of standards contained within management objectives. If resources have been used up, and reclamation would be difficult, management options would be limited to no use or development alternatives. On the other hand, if the resources are in near natural conditions, the manager may consider preservation alternatives as well as many other options. In writing standards for objectives, the manager may look at things like vegetation condition. Then he may write a biologically oriented objective which indicates that an acceptable change in vegetation is removal of not more than x percent of the present amount of vegetation.

Management Practices

Management practices often become well accepted by user publics and eventually are articulated as the way things should be done; they become normative. Many possible management objectives will require changes in management practices which are difficult to implement because of the normative character of present management. Realization of this may influence the manager's selection of management objectives. Those objectives which require a change to more visible and possibly more coercive management may be rejected because of expected problems due to changing management. Likewise, objectives which require changing access to areas (providing access is viewed as a management practice) may be shunned because of expected disruption of user behavior. In both of these cases, knowledge of the existing situation and expectations of disruption caused by different management situations may influence the selection of management objectives.

DEFINING THE MANAGEMENT AREA STRUCTURE

In order to calculate recreational carrying capacity consistent with the management objectives for an area, it is necessary to have information on the physical features of the area which determine its physical structure. The features considered may be both man-made facilities and physiographic elements.

Facilities

Facilities such as trails and campsites are important elements of the structure of an area. They tend to channel users to specific locations and to regulate rates of travel. They are also elements which can be modified by management to increase or decrease the total physical capacity of an area, given user behavior patterns. For instance, in the case of rivers, the number of available sites for camping and the number and difficulty of portages may determine outside limits on carrying capacity at any given time.

Physiographic Elements

Terrain and distribution of vegetation are important factors of an area's structure. For example, the steepness and ruggedness of terrain and the river gradient affect rates of travel, the number of available campsites, and the number of portages required. Simi-

larly, vegetation patterns influence the amount of screening afforded campsites, thus dictating the number of sites which can be used under some objectives (e.g., solitude), and they influence rates of travel at portages and for other terrestrial activities. Another important element along rivers may be the incidence and size of tributary streams which may act both as barriers to travel and as creators of major features (e.g., major fishing holes, campsites, etc.).

SELECTING MANAGEMENT TOOLS

Several kinds of information may be useful in selecting management tools for a chosen objective. Some of the information can be carried forward from the activities of selecting management objectives and defining the structure of the management area. Some other information might be derived specifically for the purpose of deciding from among an array of management tools. Such information might be grouped into three classes: user perception of management actions and user behavior, institutional directives, and existing situation (fig. 1).

Perception of Management Actions and Behavior

Often users have feelings about both the general philosophy of management (e.g., coercive or light-handed) and specific management tools. Knowing how users feel about these things may indicate which tools will be received favorably or unfavorably by users, and thus be effective in achieving management objectives. In river management, for instance, the manager may have the option of limiting the number of permits available or adjusting user fees to regulate river use. Which option is best may depend upon many factors, one of which is whether the user perceives the tool favorably or unfavorably.

Some management tools have effects on user behavior. Knowledge of the effectiveness of different tools in changing user behavior would aid decisions about which management tools to use. For example, if it considered necessary to distribute river users differently than at present, both controlling the starting time of users and providing them with information about attractions along the river are potential tools. In deciding between the two a relevant question might be, how effective is each in modifying user distribution along the river? An answer to this question would help the manager select the tool to use, if the two tools are differentially effective.

Institutional Directives

Institutional directives may play a role in the selection of management tools. If certain management approaches are favored, or required, by an agency, then they will probably be selected by managers. Likewise, if certain techniques are discouraged or barred from use, they will be eliminated early in the decision process. In river management, permits for float trip outfitters are a management tool required by some agencies. For other agencies, permits are discouraged as management tools. Whichever the case, selection of permits as a viable management tool will likely be affected by the agency posture toward permits. Other kinds of management tools may be similarly affected.

Existing Situation

As with selecting management objectives, the selection of management tools may be influenced by existing management. Both the effectiveness of tools and the current patterns of management are important. If presently used management tools are working, and management objectives have not changed, the decision of which tools to use will probably be simple; no change is needed. If, however, present objectives have changed, then the manager may search for a new set of tools. In doing so, it is possible that he will compare new tools against those he is already using.

The patterns of management that develop in an organization may also influence the choice of management tools to use. Certain tools may lead to a particular administrative routine. For instance, if river running permits are not presently being used, their introduction would lead to changed behavior of management personnel. Some employees would need to be assigned to issuing permits, some would need to keep records about the permits, and some would need to monitor compliance with the permit system. In effect, different patterns of management would develop within the organization. In considering which tools to select to achieve management objectives, information about the effect of tools on patterns of management may indicate whether or not implementation of a tool will be disruptive or beneficial to the functioning of the organization.

SELECTING MODIFICATIONS IN THE MANAGEMENT SYSTEM

The information which might be used in deciding how to change the management system is the same as that for selecting management objectives and tools. Modification of the management system becomes necessary when either the tools are not working or the management objectives are not relevant, or both. To decide on what changes to make, the kinds of information inputs previously discussed are relevant and need no further explanation.

NEEDS FOR PLANNING AND FUTURE MANAGEMENT

While several different information items have been discussed above, which ones will really be needed in the future? What information is needed to effectively respond to the future that we visualize? Some of the information needed can be simply obtained (from statutes, manuals, reports, etc.), while other information needs to be generated through research. It is these research needs which are addressed below.

As stated previously, within the next 10 years, there will be a doubling of demand for river recreation. There will be more novices using new equipment which they do not know how to use. There will be continued demand for special designations for rivers. There will be continued pressure to turn many rivers into lakes. This view of the future is one of increased demand for recreational use of rivers and one of continuing special interest demands for river allocation and possibly modification.

In responding to this future, there are several research needs to produce information for today's planning and tomorrow's management. First is the need to *identify the kinds of user demands* which might exist for river recreation. Information on what consequences are desired from recreational experiences and on what resource, social, and managerial attributes are perceived to help produce satisfaction is needed. Such information would help us understand the meaning of a doubling in demand, what expected consequences may be leading novices into river recreation, why new kinds of equipment are becoming popular, and why there is a desire for special river designations. Underlying this research need is the assumption that if we know about and understand the range of

user demands, we will be able to prepare management systems capable of meeting the demands.

Second is the need to *describe the resource system*. What recreation opportunities is it capable of producing and how easily can it be modified to produce different opportunities? How capable is the resource system of assimilating waste products stemming from recreational and other use and how well does the environment assimilate temporary intrusive elements, like people? Also, how resistant is the resource to user-induced modification? These and similar questions need to be answered for a wide range of river types and classifications. Such information would be particularly useful in identifying the possibilities for special designation (or resisting designation) and for resisting modifications in river flow, such as creation of lakes. This information, when combined with demand information, can also be used in meeting the third research need.

This third need is to explore the possibilities for *developing regional systems of rivers* to meet recreational demands. If, as expected, there are several river recreation experiences which are demanded and there are both similar and different types of rivers within a region, how might river recreation opportunities be allocated to different river segments? In the Rocky Mountain States, for instance, there are several nationally prominent white-water rivers. Segments of these rivers are capable of providing wilderness, white-water recreation. Other segments are capable of providing other types of river recreation. But how should opportunities be allocated to meet demand? A region-wide study of the rivers as a system and a study of the demands for the region's river recreation opportunities would produce information useful for developing allocation models. The information produced from this research would be most useful in considering special designations and in finding rivers on which to accommodate the probable doubling of demand.

The fourth general research need is to *determine which management tools are effective in which situations and for achieving which objectives*. If managers are to effectively deal with a doubling of demand and with a lot of users who may not be skilled in recreational use of rivers, knowledge of which management tools are effective is necessary. There will not be enough time to go through a trial and error process to deter-

mine effectiveness on each river because the management demands will not wait. What is needed is a systematic evaluation of what practices are presently being used and an examination of any new practice as it is implemented. These evaluations then need to be made available to other river managers.

SUMMARY

This paper has focused on some of the information inputs to decisionmaking for the recreational use of rivers. Possible inputs to the three major decisions of selecting management objectives, selecting management tools, and choosing modifications in the management system were identified and discussed. Inputs presented dealt with the social, resource, and institutional (including managerial) dimensions of river planning and management. These possible inputs were then evaluated in the context of one scenario of the future recreational use of rivers to identify some categories of immediate research need.