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## **Benefits Of Recreation As A Component Of Ecosystem Management**

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### Abstract:

Public land agencies are mandated to incorporate ecosystem management practices into forest planning and management. The human dimensions of ecosystem management, including recreation and amenity uses of forest lands constitute a critical component associated with management decisions. Recently, research extended the Recreation Opportunity Spectrum (ROS) concept (Driver and Brown, 1978) of experience based management, to one of benefits based management (BBM). The benefits-driven approach permits managers to target specific beneficial outcomes that may accrue to individuals, to communities, and to society from providing specific ROS settings. This paper presents some results of a study on the Dixie National Forest to examine and test some components of the BBM concept as a means of improving recreation planning and management. This study employed an on-site survey targeted to capture visitors knowledge about beneficial outcomes (expectations, desirability, acquisition and maintenance) of those benefits resulting from their visit. Preliminary results of this study reveal that visitors could not only articulate the types of beneficial outcomes desired during their stay, but also their expected outcomes acquiring these benefits. Furthermore, results revealed that because of the current condition of the recreational facilities and settings, certain desirable and associated benefits could not be obtained. Expanding the ROS framework to incorporate recreation benefits seems to be a viable research approach, and can assist in formulating design strategies for forest lands that more clearly meet the objectives for the human dimension of ecosystem management.

## Introduction:

The Forest Service directive for ecosystem management calls for the explicit consideration of the human management dimension in planning for and implementing management objectives on forestlands. Because natural ecosystems, including the human dimension of such systems, are extremely complex, integrated systems models capable of linking and spanning multiple production processes, and geographic and temporal scales, are needed to support forest management decisions (Driver et al., 1993).

Within the human dimension of ecosystem management, recreation and amenity uses of forest lands, and associated benefits of those uses, constitute an important component of management decisions. It would be useful for managers if integrated system decision support models incorporated explicit functional relationships between manageable characteristics of forest lands and recreational uses of those lands (Super and Elsner, 1993). Such explicit relationships would provide clear linkages between management activities for recreational and non-recreational uses of forest lands, and between management activities for recreational uses and the outcomes, including beneficial outcomes of those activities. What is not clear at the present are the potentials for examining benefits and their relationship to design and planning of recreation facilities. Can forest recreation landscape architects utilize the benefit approach to assist them in redesign and planning of existing, as well as the new design and planning of recreation facilities? This paper presents some preliminary results of a pilot study undertaken in the Pine Valley District of the Dixie National Forest in Southern Utah to examine and test some components of the BBM concept as a means of improving recreation planning and management of area.

## Background to Study:

A conceptual model of recreational uses of forest lands was developed in the late 1970's in response to the National Forest Management Act of 1976. The Recreation Opportunity Spectrum (ROS) model (Driver and Brown, 1978) provides a conceptual framework for the inventory and analysis of recreation opportunities on forest lands. The model defines a spectrum of specific combinations of physical, social, and managerial setting characteristics that facilitate particular kinds of recreational experiences. In order to operationalize the ROS concept in the field to support forest management decisions requires a certain level and mastery of abstract concepts along with careful inventory and land mapping techniques. Efforts targeted at assisting forest managers using ROS as an inventory tool to utilize Geographic Information Systems (GIS) for spatial modeling and managing data useful in ROS applications has been spotty (Gobster et al., 1988). Most federal land managers and recreation staff while slowly shifting to automate mapping techniques have continued to employ field inventory and hand mapping

techniques to build ROS maps. These maps have been primarily used at the forest level planning; are not computer generated and lack sophistication, accuracy, and scale necessary for desired site level design and planning. A computer driven and GIS based software package modeled on the ROS concept has been developed with support from the Forest Service North Central Forest Experiment Station (Itami and Rawlings, 1994). The objectives behind the automated implementation of the interactive GIS-Based modeling ROS tool are to provide a tool that requires minimal GIS spatial modeling experience for recreation specialists, but provides maximal benefits in terms of analytical power. More importantly, is to provide a tool where changes to forest resources such as logging operations which effect recreation opportunities can be modeled, alternative plans developed, and adaptive management strategies developed.

A computer implementation of ROS is designed for those experienced in the implementation of the USDA Forest Service Recreation Opportunity Spectrum (ROS) and the Visual Management System (VMS). This software implementation of the ROS uses SAGE (Itami & Rawlings, 1994); a raster based GIS to build either an ROS or VMS model. Mapped data can be created from AutoCAD (or equivalent) DXF files, or transferred from other GIS systems, using SAGE Capture (Itami & Rawlings, 1994). An AML (Arc Macro Language) supported ARC INFO version of the ROS/VMS software is currently being developed and will be available in late 1995 (Itami, 1994). This program has considerable potential to provide forest managers with a tool to spatially model ROS setting attribute data in a GIS format. This program generates a GIS based model of the six ROS classes; Physical Environment, Remoteness, Size, Evidence of Humans, Social Setting, Managerial Setting and Setting Inconsistencies. This software provides the user with the ability to generate alternative plans within the standard ROS framework quickly, without having extensive training or knowledge of GIS. SAGE ROS builds models automatically with a simple graphic user interface for variable selection. By utilizing a map command language to automatically build executable, error free code, using an expert system to advise the user in resolving setting conflicts and provides mapped output for all components of the ROS model.

The utility, flexibility, functionality, and reliability of the ROS/VMS software to perform ROS analysis compatible for current forest recreation management practices have been tested in several studies (Zerger, 1993; Gimblett et al., 1994, 1995). These tests have clearly demonstrated the utility of the program and conclude that it has considerable potential to provide forest managers with a tool to spatially model ROS setting attribute data in a GIS format and generate alternative plans within the standard ROS framework. These experiments have clearly demonstrated the need for such an automated tool and point to weaknesses in current forest inventory methods for supplying spatial data necessary for high quality recreational analysis. One component of the ROS model that is sufficiently lacking is the social setting data. Data is lacking on where visitors go in the forest, how long they spend, why they go to these specific places, what they

expect from their visits in terms of experiences and benefits, and what the forests have in terms of existing facilities to meet these needs. What is required are not only new tools to model forest recreation needs but improved knowledge of the human dimension of ecosystem management which could lead to more reliable analysis and predictability of recreation experiences and associated benefits.

To increase our knowledge of forest recreational needs, experiences and benefits, a research program was initiated in the late 1980's at the Rocky Mountain Station which began to examine the benefits of amenity goods and services, including those associated with forest land recreation. Following a conference on the leisure benefits which was attended by more than 50 experts from around the world, a selection of papers were bound and published (Driver et al. 1991a). This collection spans a diversity of perspectives on benefits of leisure behavior. Benefits are grouped or defined in many ways, but as indicators of gains or positive outcomes of human actions. They are shown to be essential to the formation of policies and resource allocation decisions, especially for forest land managers (Lewis and Kaiser, 1991). Knowledge of the relationship between benefits, leisure activities and experiences are based on several research efforts, discussed and summarized by Driver et al. (1991b). Benefits, at this point, are largely inferred from experiences, and described as perceived benefits. This perceived benefits approach extends the ROS concept of experience based management to one of benefits based management. Traditionally, the ROS concept has focused on opportunities for individual recreator's experiences. Longer term benefits are believed to accrue to individuals as a result of experiences, as well as to communities and society. The benefits driven approach permits managers to target specific beneficial outcomes that may accrue to individuals, to communities, and to society from providing experience opportunity settings. The difference between experiences and benefits lies in the assumptions that not all experiences are positive or beneficial and that beneficial outcomes are ones that maintain or improve the condition, or state of an individual, community or society. Further research is called for to define more explicitly the relationship between benefits and experiences.

One outcome of this focused attention on the benefits of leisure is a new initiative developed in the Rocky Mountain Station call Benefits Based Management (BBM). Lee and Driver (1992) lay out a framework for this initiative that describes a benefit "chain of causality." Two related directions emerge from the framework: a new management focus for recreation uses of forest lands that is benefit driven, and, needed research into links in the "chain of causality". The Rocky Mountain Station is funding a series of pilot studies, at different locations in the United States, that involve both benefits based research and applications methodology for BBM.

The ROS framework, including the concept of benefits based management, provides

needed guidance for incorporating recreational uses into ecosystem management. To date, however, explicit linkages between benefits and experiences obtainable from recreation opportunities and specific setting attributes that are under management control have not been clearly established. Research is called for that begins to define these linkages in measurable ways. While much controversy lies ahead for the BBM approach, it is apparent that we cannot know absolutely if benefits are gained from experience opportunities, we can assess the perception of benefits held by people. If this does prove to be the case and we can make strides to analyze beneficial outcomes of experiences, then perhaps this information is sufficient for deriving design and management guidelines in forest environments. If this is the case then maybe we can truly place recreation experiences and beneficial outcomes at the top of the list of resource management issues. The remainder of this paper will discuss the pilot study in the Pine Valley District of the Dixie National Forest in Southern Utah and some attempts to make the connections to the physical landscape for redesign and planning of forest areas.

#### Pine Valley Recreation Area Benefits Application:

The Pine Valley Recreation area (PV) was constructed in the 1950's to accommodate local recreation needs, as well as the occasional non-local visitor. Due to rapid population growth of the surrounding areas: PV, Utah, Nevada, Arizona and California, this recreation area has become ever more popular as so many of the other National Forests and Recreation areas in the United States. PV has become an extremely desirable spot for weekend visits due to its close proximity (within 2-4 hr.) to major urban centers such as St. George, Las Vegas and Salt Lake City. The lush mountain vegetation, cool waters and accessible wilderness area has contributed to its increased usage. However, the existing recreation facilities perhaps like others built in the early 50's are outdated, need repair and no longer meet the needs of the recreating public. Impacts from long term abuse, over crowding and changing recreational use forced the Forest Service to seek assistance in planning, redesign and management of the area. In addition to the crowding issue, PV contains the Whipple trail, which is a nationally designated recreation trail that has attracted recreators nationally seeking access to wilderness areas.

In 1982 an Environmental Assessment Recreation Plan was undertaken to address the current and future needs of PV. This study was regional in nature, conducting a random census phone survey to obtain demographic data regarding its use. While this study provided some basic demographic data it did not examine the specific types of recreational use sought and resulting beneficial outcomes recreators are seeking and desire from PV. While the recreation area falls within three ROS categories in terms of management, little was known about the heterogeneity of experiences that could be obtained within these categories, the physical setting and attributes that affect these experiences, and linkages to beneficial outcomes. This became a perfect opportunity to test the concept of BBM (in a limited sense)

and attempt to make some linkages to physical attributes and settings that conspire to allow the recreator to obtain those benefits. If this could be accomplished then this data could be used to assist forest recreation landscape architects in planning and deriving a revised recreation masterplan for the area, targeted at maximizing beneficial outcomes.

An on-site survey was developed with the FS to obtain the necessary data for this redesign and planning process. Recreators were interviewed at several targeted locations in the PV recreation area from May, 1994 through August, 1994. While only four months of data were collected which is not extensive by any means, it was enough to get an understanding of desired use. These survey locations were strategically sampled within each of the ROS designated classes. The random survey was conducted at six locations throughout PV with campsite, picnicking, trailheads and reservoir sample locations among others, representing the continuum of recreation use and ROS areas. Respondents were asked demographic questions to ascertain where they came from, how long they intended to stay etc. In addition, recreators were asked what recreational activities they intended to do while in the PV area, how long they intended to spend doing this and suitability in terms of environment and facilities to do these activities. Respondents were asked to identify from a list of some of the possible benefits identified by (Driver et al., 1991b) as to their desirability to acquire such benefits, and their ability to obtain and/or maintain those benefits. In addition, respondents were asked to list any important natural landscape features that make the place ideal or alternatively a detractor from them achieving those benefits.

The area was mapped out and a model was developed in the ROS/VMS software to verify ROS classifications for the area. This analysis was used to identify sites that needed to be sampled. Also by using this analysis technique, we could link what we learned from the benefits component of the survey and make some linkages back to modeling benefits in the PV recreation area.

#### Results and Discussion:

Through the sampling period ninety (n=90) respondents were interviewed. Out of that ninety, it was found that 45% of the users came from Las Vegas, 30% from Southern Utah and 25% from other destinations such as Los Angeles and Salt Lake City. 86% of those that came to PV as their final destination while only 14% used PV as a short stay on route to one of the surrounding National Parks. 27% of the visitors surveyed came to PV because of the cool mountain climate and only 21% came because it was close to home. This is an important finding considering the PV recreation area was created to accommodate local recreational needs. 52% of the visitors tended to stay anywhere between two and four days, while 29% stayed more than four days. A small number came for only 1 day. Out of the total population of visitors that were interviewed 45% were day users consisting of picnicking, fishing, and hiking, while 30% were tent campers, and 25% were RV campers. It was

found that the age distribution of users was diverse with 30% between the ages of 30-40, 25% were between the ages of 40-50, 26% over the age of 50 and 20% between the ages of 20-30. This shows that PV has a wide spectrum of recreational benefits that appeal to a variety of age groups. Of these age groups 40% recreated in a group of more than 4 and 34% in groups of 2-4 and 26% with 1-2 in the group. This information is crucial in all phases of design, planning, and management: it signifies the need for a variety of group accommodations, and will allow management plans to fulfill user needs while maintaining the resources of the area.

An open-ended question of other benefits desired in the forest revealed that 82% desired family time, enjoy the natural surroundings and to keep cool. While these are benefits sought by the visitors 55% also indicated the existing water/streams, vegetation, and mountains in the area to be an important contributors to them obtaining their benefits. On the other hand of those sampled, 52% agree that the noise of other campers and crowds of people detracted from their experience, as well as prohibited them from achieving their desired benefits. It is interesting to note that even though people wanted to be away from crowds, 47% wanted to assist others, besides their family and friends, to develop skills such as camping, fishing, and outdoor education. Further analysis of the data is showing conflicts between RV and tent campers. The tent campers stated that the actual RV's had a negative impact on their experience because they blocked aesthetic views. Also, tent campers complained that the noise of RV generators drastically inhibited them from achieving desired benefits. This information shows that RV and tent users should be separated, which can be achieved in both the design and management stages, to provide a maximum benefit to all types of users. Since a majority of tent campers, 56%, wanted to camp next to the stream, soil compaction and vegetation destruction are becoming a serious problem in many areas of PV. This is a direct result of the high numbers of constant users throughout the season. When specifically asked if campers would mind if the campsites were moved back a minimum of fifty feet to re-establish fisheries in the river the response was very positive. This information can be integrated into GIS to provide a buffer around the riparian corridors of PV so that re-vegetation can occur while still allowing positive beneficial outcomes to the users.

When asked what improvement users would like to see in PV 35% the respondents wanted improved amenities such as flush toilets and showers throughout the area. Also the RV users wanted a closer refuse disposal station.

Table #1 Mean scores for types of outdoor activities recreators intend to do in PV area, longevity of stay (1 hr) to (5 more than a day), suitability of place for activity on a Lickert scale of 1 (low) to 5 (high)

<u>Recreational Activity</u> <u>Appropriate</u>	<u>Time Intent on</u>		<u>Suitability of Place</u>	
	<u>Spending</u>	<u>to Perform Activity</u>	<u>Yes</u>	<u>no</u>
<u>Activity</u>				
Camping near vehicle	3.83	4.56	6.7%	
Sightseeing/driving for pleasure	2.03	3.9	7.0%	
Four wheel drive/ATV driving	1.21	1.56	3.5%	
50.6%				
Hiking/walking	2.47	4.6	5.6%	
Motorcycling	1.07	1.46	6.7	4.9%
Mountain biking	1.38	2.7	13.5	16.9
Road biking	1.21	2.79	7.9%	6.7
Photography	1.94	4.5	2.2%	1.1
Partying	2.16	3.4	4.5%	
13.5%				
Group camping	2.6	3.6	4.5%	
Rock collecting/prospecting	1.4	2.2	3.3%	4.6%
Hunting	1.7	2.5	2.2%	
17.0%				
Fishing	2.85	3.83	3.3%	
Studying nature	2.0	3.9	4.5	
Swimming	1.26	1.7	48.3%	
27.0%				
Rock climbing/bouldering	1.4	2.9	4.5%	
Picnicking from camping	2.13	3.95		
Watching wildlife	2.7	4.5		
Horseback riding	1.5	4.0	5.6%	
Historic interest	1.6	3.3		

An examination of Table #1 which examined recreational activities and the amount of time recreators sampled, suitability of the place to perform these activities, and whether this was an appropriate activity for the area produced some interesting results. Of those sampled it appears that the recreational use of PV was primarily day use with most visitors staying from one to two days. Of those that visited and recreated in the area it appears that camping near vehicle, hiking/walking, partying (socializing with friends and family), and fishing were the activities that the most time was spent. Users rated camping near vehicle, sightseeing/driving for pleasure, hiking/walking, photography, studying nature/wildlife watching, and horseback riding among the highest for suitability of place to perform activity. In addition, four wheel driving, mountain biking, and swimming ranked among the lowest, but when asked if they would be a suitable activity for the area 51% said that off road vehicle use was not appropriate for the area. This was also found to be true with 50% responding that motorcycling was not appropriate. Conversely, 48% of those sampled agree that swimming is an



appropriate activity for the area, but at the current time the reservoir area is for fishing only.

Table #2 - Mean scores for responses to types of benefits, desirability to attain those benefits on a Lickert scale of 1 (very undesirable) and 5 (very desirable) and ability to obtain or maintain those benefits in the settings sampled.

<u>Benefit type</u>	<u>Desirability</u>	<u>Able to</u> <u>Maintain</u> <u>or Obtain</u>
Improved physical fitness	3.5	4.4
Reduced stress	4.8	4.6
Improved mood	4.6	4.5
Gain spiritual awareness	3.7	4.2
Gain self-confidence	3.2	4.0
Gain feeling of independence	3.7	4.1
Learn more about natural history of the area	3.3	3.1
Learn more about the cultural history of the area	3.2	3.1
Get away from crowds	4.7	4.0
Do something creative: Sketch, paint, take photos	3.3	4.4
Assist others to develop their skills	3.6	3.8

An examination of Table #2 reveals some interesting data on the desirability of benefits and ability to obtain or maintain them. Visitors sampled come to the forest to recreate, but the benefits of the activities they come to do can not only be articulated but seem to be appropriate for the area. Of those desired most in the forest, recreators come to reduce stress, to obtain a sense of improved mood. Results of the survey clearly illustrate that the forest provides them with the ability to obtain and maintain those benefits for a period of time. While physical fitness and doing something creative are not highly desirable, those sampled could obtain those benefits from the forest if so desired. Spiritual awareness also seems to be a desirable benefit and can be highly obtained. On the other hand while recreators highly desired to get away from crowds, results illustrate that it was not as easy to obtain as some of the other benefits and certainly not easy to maintain. This could be due to the overcrowding that occurs in the forest and number of encounters in campgrounds and trails. This may also be due to the fact that the campgrounds are currently very close together and vegetation buffer zones have been denuded in areas where daytime visitors recreate.

This information can be used to create guidelines for redevelopment of PV recreation area, as well as other recreational facilities, by giving a clearer picture of what benefits people expect to obtain and maintain during their

recreational activities within a particular forest setting. Within that setting, this information starts to focus on the benefits that people are actually receiving, showing specifically what the positive benefits are, as well as negative detractors that are being experienced within the different settings.

The impacts of benefits that were obtained and not obtained is illustrated by the differences between wanting to reduce stress, improve mood and to get away from crowds. The users in this study responded that they desired to reduce stress and improve their mood and felt that it would be possible to obtain. When looking at the question of getting away from crowds and maintaining that status, respondents were unable to maintain this because of the increase numbers of recreator's in PV. Furthermore, since the closeness of camp/picnic sites and the deterioration of vegetation, along with inadequate amenities to serve the users, it is not possible to maintain the desired benefit of getting away from crowds. In addition, respondents said that physical fitness was a low desirability but it would be possible to obtain if so desired. A closer look into the feasibility of actually obtaining physical fitness may prove to be a greater challenge. The possibilities of conflicts between equestrian, mountain bikers and hikers on the existing trail systems is becoming more of an issue, including the access to the trail heads from camp/picnic sites. This is one example how the human dimension in ecosystem management can be addressed with the use of BBM and GIS technologies. By using BBM in conjunction with the spatial modeling techniques of GIS these conflicts can be addressed and viable design and management alternatives can be offered. In this case new campsite and loop designs with improved amenities can be created that would accommodate a greater user base while providing the solitude that recreators are coming to PV for, but more importantly, addressing and incorporating the human dimension into ecosystem management.

Other important aspects that this study reveal is that not all benefits that can be provided or achieved in an area are wanted. An example of this is recreators not wanting ATV's and motorcycling in PV. Contrasting this, is the fact that even though swimming is not currently provided in PV and is not rated very high as to be a suitable place to perform that activity at the current time, it is highly desired as an appropriate activity for the area. With this information amenities can be included in the redesign of PV that have a positive beneficial outcome.

#### Conclusions:

Until this pilot study, information that is being revealed was not previously available to FS planners, designers, and managers. Past practices of managing forests in a technical knowledge mode is now starting to be replaced benefits based management style, and plays an essential part in defining and incorporating the human dimension into ecosystem management. The relationships that are being formulated from this study will help define existing ROS categories and enable them to be broken down into more manageable sub categories so that GIS mapping

techniques can be incorporated into integrated system models. This will become an important tool enabling a more clearer link to the available resources and the benefits that can be derived from a specific setting.

This study begins to show that it is possible to obtain knowledge of the benefits individuals are desiring. They can not only articulate the types of beneficial outcomes desired during their stay, but expect to acquire and maintain such benefits. Also, results revealed that because of the current condition of the recreational facilities and settings, certain desirable benefits could not be obtained, or were not desired to be obtained. The physical environment of PV displayed that it is possible to assess benefits based on physical surroundings. Respondents were able to formulate what natural features enabled them to achieve their desired benefit.

Benefits of leisure need to become part of all planning, design, and management criterion, and understood as a resource in order to be effectively incorporated into the human dimension part of ecosystem management. Unlike other forest resources, it presently seems difficult to put an exact dollar amount on the benefits that a site has to offer, together with the benefits that people can receive from a site. However, understanding, mapping out, and implementing the benefits that individuals, communities, and society receive, will be the challenge for all branches of financial allocation and planning/management teams. It is not only important to understand what benefits people want, but what benefits a particular site can offer while maintaining a sustainable ecosystem. By incorporating the information that was generated by studies such as this one, with the aid of GIS mapping, integrated system models can begin to incorporate the functional relationships of recreational users and site settings to help make linkages between management activities for recreational and non-recreational uses. The potential for examining benefits and there relationships to design and planning of recreation facilities is a viable tool and is an example of how the human dimension can fit into ecosystem management. Forest recreation landscape architects can utilize the benefit approach to assist them in redesign and planning of existing, as well as the new design and planning of recreation facilities. With the integration of GIS and what is learned from this benefits study, a redesign of PV can be formulated and here are some of the design guidelines that could be used.

- Defining what the issues or conflicts are.
- Defining if the area can sustain and remain viable when the human dimension is introduced.
- Finding out what benefits can be derived from the area.
- Finding out what are the benefits that individuals desire.
- Running ROS software for the area to see what are the existing classifications.
- Running GIS and integrated system models to map out areas of benefits or

possible non-benefits settings.

-Planning and design process.

-Final designs completed and management plans are formulated.

Since the demand for resources are becoming more and more competitive and the resources themselves are increasingly becoming scarce, future research needs to address the importance of understanding the benefits of leisure within ecosystem management. Better linkages between specific settings and the benefits that can be expected and obtained are needed, along with more comprehensive GIS packages. Also, ROS software is needed to link and adopt benefits so that they can be mapped out and incorporated into design and management criterion.

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