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# AREA-ORIENTED MULTIPLE USE ANALYSIS

by Merrill K. Ridd



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# INTRODUCTION

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Since the introduction of "conservation" as a resource management slogan, few expressions concerning resources have awakened such interest as "multiple use." And few have raised more questions. Perhaps because of the complexity of multiple use management in action, research has not yet come to grips with some of the vital aspects of the public land manager's problem.

The purposes of this paper are: first, to clarify the purpose of multiple use management; second, to discuss approaches to multiple use analysis; and finally, to illustrate the need for area-oriented multiple use analysis and to suggest the issues that need to be considered.

## Meaning and Objective of Multiple Use

The term "multiple use" may be applied either to areas of land or to particular resources. When applied to land areas, it refers to varied uses; that is, the production and management of various resources or resource combinations on a given land unit (left-hand side of figure 1). The relation of the several resources in the area to one another may be competitive or complementary.

When applied to individual resources, "multiple use" refers to utilization of a particular resource for various purposes. For example, water may be used for irrigation, municipal and industrial water supply, recreation of various types, and other varied functions. Here again, uses may be competitive or complementary. Timber, in the same sense, may be used for lumber, pulpwood, Christmas trees, or scenery. Forage may be used as feed for cattle or for wildlife, for scenery, watershed stabilization, and so forth. Multiple use land management actually involves both multiple use of

individual resources and of land areas. Demands on particular resources for specific uses, in turn, place demands on land areas where resources are produced.

The object of multiple use management is very simple. It is to manage the resource complex for the most beneficial combination of both present and future uses. The idea of deriving maximum benefit from a given resource base is not new, but it becomes more important as competition increases for limited and interrelated resources. It was not until 1960 that Congress enacted legislation to establish "multiple use" as policy on any of the public lands. For the National Forests, the policy was laid down by Public Law 86-517 of June 12, 1960. The law states in part:

The Secretary of Agriculture is authorized and directed to develop and administer the renewable surface resources of the national forests for multiple use and sustained yield of the several products and services obtained therefrom.

The principle of sustained yield is corollary to multiple use. It is, in fact, implied in the definition of multiple use given in Public Law 88-607 of September 19, 1964, outlining authority for multiple use management of land in the custody of the Bureau of Land Management. This law indicates that:

"Multiple use" means the management of the various surface and subsurface resources so that they are utilized in the combination that will best meet the present *and future* needs of the American people . . . .

While the doctrine of multiple use is widely accepted, there is still some misunderstanding of how it should be accomplished. The multiple use concept does not demand that every acre in question be utilized for

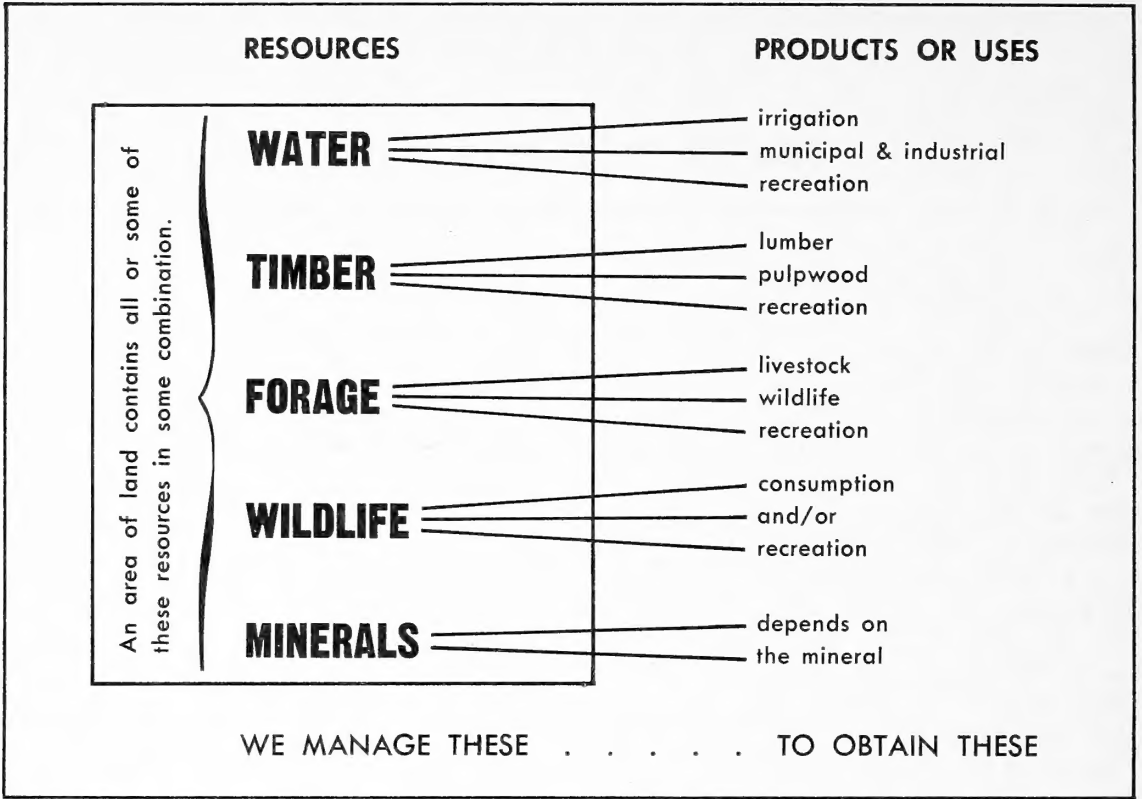


Figure 1.—Resources and resource uses

### RESOURCES

A discussion of multiple use often relates primarily to the first four resources listed above — the renewable surface resources of water, timber, forage, and wildlife — along with recreation, meaning the recreation opportunity. Actually, of course, recreation is a kind of use (see footnote 2). Minerals, because of their different character, are not always listed. They are not renewable in the usual sense, their distribution is generally erratic, and they are often under the surface. Nevertheless, where they do occur and are exploited, their extraction often has real effects on the surface resources, and thus becomes an important part of multiple use management. In a very real way we manage the method of their exploitation to protect other resource values. Soil is not listed because we do not manage it *per se* for use but as the basic constituent of the watershed and a foundation for the surface renewable resources and crops.

### PRODUCTS OR USES

Many other products and uses could be listed. Use may take place on site or at some distant point. It may be consumptive or nonconsumptive.

In the case of recreation, use may be centered primarily on one resource; however, the "quality" of the recreation experience is generally influenced by an assemblage of resources — the environmental complex. Wilderness is a primitive or near primitive condition of the environmental complex.



all possible uses and resources simultaneously. Both Acts cited above point out that some land will be used for "less than all of the resources." Designation of a wilderness area, for example, does not necessarily violate the multiple use philosophy. Such use may not provide the greatest dollar return, but when the whole scale of values is considered it is presumed to provide the greatest overall benefit for that particular site. However, highly restrictive use areas will occupy a small percentage of the total acreage of public wildlands. Most of the public land will be utilized, to varying degrees, for a wide array of uses, as dictated by capacity, demand, and prudence.

Multiple use management of the land may be accomplished by any one of the following three options, or by any combination of the three: (1) concurrent and continuous use of the several resources obtainable on a given land unit; (2) alternating or rotational use of the various resources or resource combinations on the unit, so that multiple use is achieved on a time basis; or (3) geographical separation of uses or use combinations so that multiple use is accomplished across a mosaic of units. All of these are legitimate multiple use practices and should be applied in the most suitable combination on lands under public administration. It is significant that in all three options noted above we are dealing with areas of land. Public Law 86-517 states:

In the administration of the national forests due consideration shall be given to the relative values of the various resources in *particular areas*. (italics added)

A similar statement appears in P.L. 88-607. Delineation of relatively homogeneous units of land with respect to physical characteristics and use potential is helpful both in inventorying and in managing the land resources. Units vary in size, and combinations and degrees of use vary between units. Size of the units depends primarily on the degree of heterogeneity of the landscape.

From the public's point of view, regardless of the area in question, multiple use management must become involved in a somewhat broader set of parameters than

the private investor is usually concerned with. Whereas the private investor makes decisions based upon the profit motive, a nation interested in preserving benefits for future generations may have to make investments and provide safeguards beyond the dictates of limited business economics. The western range industry illustrates the point. Early stockmen maximized direct, short-run returns, and, as a result, contributed to the eventual deterioration of other resource values as well as to the decline of the range industry itself. Multiple use is the antithesis of this. It provides a plan with vision, a plan that accommodates the full spectrum of today's needs and at the same time provides for tomorrow's requirements, a plan which will keep short-range objectives and short-sighted evaluations from sweeping away opportunities for the future.

Both P.L. 86-517 and P.L. 88-607 make it clear that the application of multiple use principles requires "harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land . . . ."

The multiple use philosophy is deeply rooted in two axioms. One is that renewable resources belong to all the people (not to selected groups of users) and to all generations. The other is that resources represent capital — just as real as the capital invested in man-made structures. Wise use of this capital generates economic growth and social benefits; unwise use will result at the same time in some drain on the social economy. Consequently, we must be careful to avoid excessive use or mismanagement for current gain, which would lower the productive capacity of the resource base and unduly handicap future generations. Ciriacy-Wantrup<sup>1</sup> urges maintaining a "safe minimum standard of conservation," by refraining from using the resources to the point that would make it "uneconomical to halt and reverse depletion." While the problem of defining what is economical is still open, the

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<sup>1</sup>Ciriacy-Wantrup, S. V. *Resource conservation: economics and policies*, p. 253. 395 pp., Rev. Ed. Berkeley: Univ. Calif. Press. 1963.

principle is sound. Ruskin summed it up this way:

God has given us the Earth for our life. It is a great entail. It belongs as much to those who follow us as it does to us, and we have no right by anything we may do or neglect to do to involve them in unnecessary penalties or deprive them of benefits which are theirs by right.

Thus, we must endeavor to provide the combination of products required by the present generation, and at the same time secure production alternatives for the future. The challenge for multiple use research is to help provide not only the data but also the framework on which this type of program must be based.

### Multiple Use Analysis

From a practical standpoint there are two fundamental types of multiple use research: resource-oriented and area-oriented.<sup>2</sup> To draw such a distinction may be a little hazardous because the separation is not always clear-cut. Yet there is a sharp difference in method and objectives. Both, however, are essential and nothing in this discussion should be construed as an effort to rank them in order of importance.

The resource-oriented approach seeks to discover interrelations among the several resources; e.g., how the management of one resource affects production in others or how one use of a particular resource affects other uses of the same resource. Thus, physical rates of substitution between resources or resource uses, and even cost and benefit comparisons of alternative production combinations may be taken into account. Resource-oriented studies may deal with a single resource in alternative uses, with two re-

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<sup>2</sup>In this connection, "area" connotes more than space or location; for purposes of this discussion an area is a segment of the natural environment and human culture, which we may call a human ecological community.

There may be "people-oriented" multiple use analysis, which would look at resource relationships from a standpoint of the needs of society. It will be seen that, for specific areas at least, this aspect is encompassed in area-oriented analysis.

sources, or with several. They may range from highly abstract to primarily empirical methods.

Typical of an abstract approach is the effort by Gregory<sup>3</sup> to fit multiple use into joint production theory. Another example is Hopkin's<sup>4</sup> hypothetical transformation curve showing the different numbers of cattle and deer that could be produced simultaneously on a land unit. After the curve is constructed, Hopkin assumes a price ratio or value relation between deer and cattle and illustrates the optimum production level of each. To the manager of public lands, the real problem in applying such a theory lies in establishing a meaningful value relation between a cow and a deer. In spite of this problem, theoretical models help to sharpen our conceptual framework, provided we recognize the critical limitations that result from taking the problem out of context.

A good example of an empirical study in resource-oriented multiple use analysis is the so-called Beaver Creek Project in central Arizona. In the Salt and Verde River basins northeast of Phoenix, the Rocky Mountain Forest and Range Experiment Station in cooperation with several other agencies has set up a carefully designed study to determine the response of water yield to various treatments of the watershed.<sup>5</sup> Initially a water problem, the project has broadened into a sound multiple use research program. Its purpose is to determine the effect of various watershed management practices not only on water yield, but also on livestock, forage, timber production, wildlife habitat, and recreation potential. In addition to gathering much needed data on physical interrelations and production rates, the plan calls for an evaluation of costs and benefits involved in the various land treatment measures.

The information being developed by resource-oriented studies is basic to an under-

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<sup>3</sup>Gregory, G. Robinson. *An economic approach to multiple use*. *Forest Sci.* 1:6-13. 1955.

<sup>4</sup>Hopkin, John A. *Use of economics in making decisions relating to range use*. *Jour. Farm Econ.* 38: 1594-1603. 1956.

<sup>5</sup>U.S. Forest Service. *Rocky Mountain Forest and Range Expt. Station Annual Report(s)*, 1961-63.

standing of resource capacities. Yet from the viewpoint of the public land manager something more needs to be considered — community and regional dynamics. To accomplish sound management, resources must be related not only to each other but to settlement patterns, markets, access, and to the changing nature of these factors. These things are not constants, and cannot be ignored. The public land manager's job is not just to maximize product output. He must find a balance between resource capacities and community demands. He needs some guidelines for doing this. Area-oriented multiple use analysis can provide these guidelines.

In multiple use land management, there are resource capabilities on the one hand, needs and wants of the people on the other, and the interaction between them (fig. 2). Until research likewise encompasses all three, it cannot satisfy the requirements of the land manager. Only by examining specific situations on the ground is it possible to effectively analyze these relations and thereby identify the land use issues — hence, the necessity for area-oriented, or areal analysis.

Resource-oriented and area-oriented studies in multiple use may be indistinguishable in some respects inasmuch as a large body of material is common to both fields. Both are concerned with the interrelations among resources. However, their viewpoints are quite different. The major objective of resource-oriented studies is the discovering of relationships among the resources and their uses. Areal studies have as their core objective the analysis of specific resource situations in particular areas. They deal not only with the supply of resources, but also with demand in a rather comprehensive way. Areal analysis draws from resource studies that information needed to describe resource potentials of the area in question, and relates this to the changing local and regional demand for those resources. A fuller explanation of this follows.

Both kinds of multiple use analysis are essential and should be encouraged. They are complementary. Some fine progress is being made in resource-oriented studies, but the field of areal multiple use analysis has been little cultivated. The remainder of this paper discusses the methods and issues involved in areal analysis.

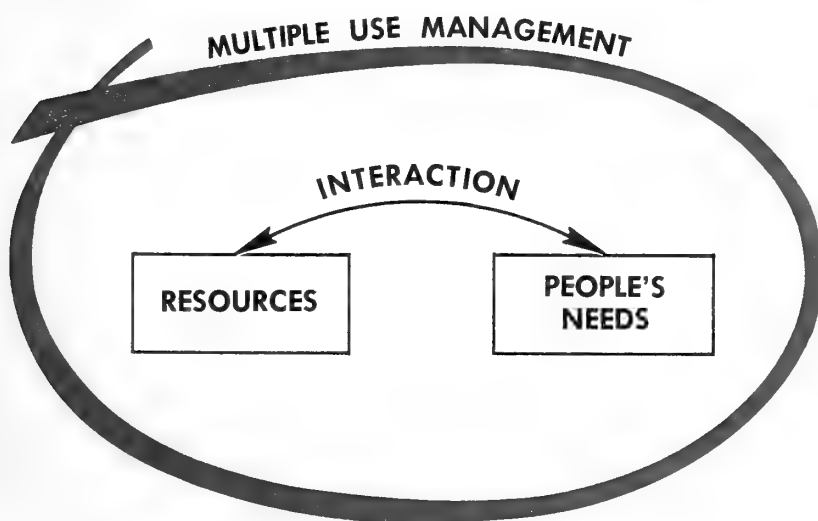


Figure 2.—Schematic diagram of multiple use management of the land.

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# AREA-ORIENTED MULTIPLE USE ANALYSIS

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## Fundamentals

The purpose of areal multiple use analysis is to provide an analytical framework for evaluating the pertinent physical, biological, economic, and social factors relating to resource development in a particular place as a basis for making sound land management decisions. As indicated earlier, the basic frame of reference in which the many factors may be analyzed is a specified area of land.

**Delineating the area of study.**—For this discussion, an area is a portion of the landscape where man and his activities provide a meaningful unit for analysis. The area is outlined on the basis of land use considerations rather than by political or ownership lines, except where the latter are fairly well aligned with patterns of land use.

The area is a sort of functional unit with a high degree of internal cohesion and interdependence with respect to land use and resource considerations. Such an area may be regarded as a human ecological community. Like any biotic community it is at the same time related in important functions to the outside world.

These questions naturally arise: Isn't each area unique, thus requiring separate analysis? How is it possible to extend findings beyond the area analyzed? Of course each area is unique. Usually, however, there are some broad characteristics that permit some generalizing.

In order to identify some of these broad patterns one might begin at a statewide level to get a picture of the distribution and flow of resources and resource uses. The State can then be divided into provinces with respect to characteristics of land use. In Utah, for example, five land use provinces may be identified (fig. 3). Each has its distinguishing and unifying characteristics.

Within a province an area may then be selected for detailed analysis. If carefully chosen and delineated, the area may satisfactorily represent the land use problems and opportunities of the province as a whole. Analysis made within the area will then provide broad guidelines for the province, as well as more specific guides for the area itself.

In our multiple use study, the Paunsaugunt Plateau Area was selected and outlined to represent south-central Utah (fig. 3). The area consists of about 1,000 square miles, with the Paunsaugunt Plateau and the clusters of communities about its base functioning as a node. The area consists of part of

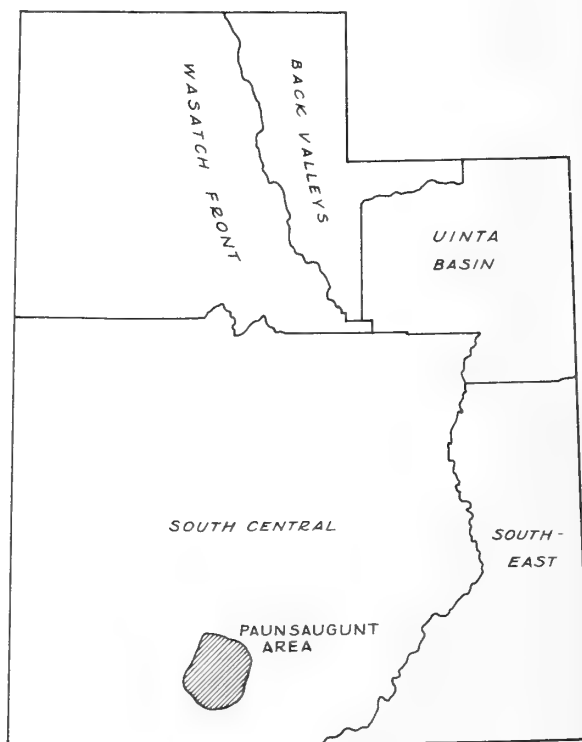


Figure 3.—Land use provinces of Utah, a tentative delineation.

one National Forest Ranger District on the plateau, Bryce Canyon National Park on the eastern rim, a scattering of private land around the foot of the plateau, and a large stretch of Bureau of Land Management land reaching out to the south and east.

**Defining the issues.**—No area is an island. It is but a part of a region and a nation. Hardly a thing can be done in the management of the resources in an area that does not affect material, money, and people far beyond the confines of that place and far into the future.

The study area serves as a stage on which the elements of resource utilization can be examined. As indicated earlier, the multiple use decision-making process must consider more than resource interrelations. Many other factors enter in. For purposes of this discussion, the factors which should play a role in multiple land use decisions, and therefore enter into analysis, are assembled into four groups:

1. The condition and capacity of the resources, and costs of production.
2. The flow of benefits from the resources and their distribution to the social economy within and beyond the area.
3. Trends in use of the resources, anticipated influences from inside and outside the area, and projected demands, and
4. The institutional structure through which the resources are utilized.

The first group involves an analysis of the condition, trend, and interdependence of the resources, and an estimate of potential production under varying management practices and costs. The second involves an evaluation and comparison of the existing and potential economic and social benefits generated by each of the resources of the area, and the distribution of those values in space and time. It involves an examination of the local economy and culture, its dependence on the resources of the area, and the dependence of outside communities on the same resources. The third group is concerned with trends in resource use in the area; developments taking shape in the community, region, and nation, which may influence the local economy and resource use; and finally, projected

demands on the local resources. The fourth group calls for an evaluation of the political and social structure through which resources are utilized, and the possible effects on resource development.

All of these factors must be considered in a context of space and time. Values stemming from local resources extend beyond the local scene to state, regional, and national levels. They may be enjoyed today or they may accrue to future generations as a result of wise planning and investment. Conversely, future generations may suffer because of inaction or poor management today.

### Selected Examples From the Paunsaugunt Area

To illustrate some aspects of the four groups of factors, a few examples from the Paunsaugunt Area are selected. Many other

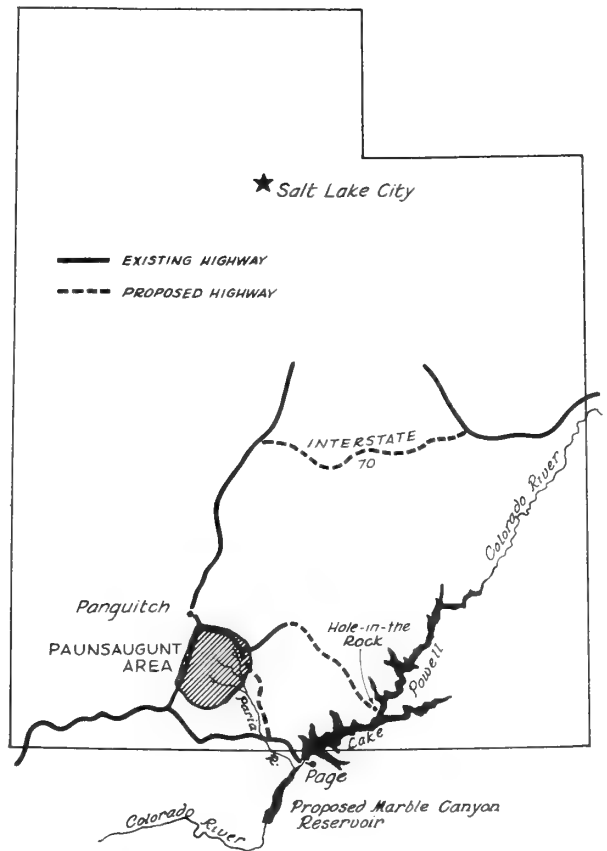


Figure 4. The Paunsaugunt Area and some related features.



Figure 5.—Generally we speak of resources in terms of what they contribute to the economy. But some resources may become a liability. This once-productive rangeland was converted to sagebrush and pinyon-juniper cover; now it is being riddled by erosion. Sediment leaving the area is not only a loss of capital here, but a liability downstream.

examples could have been chosen. Those described here merely illustrate the nature of the problem.

**Condition and capacity of the resources.**—Land in a declining condition presents a problem quite different from that of healthy land. Thousands of acres of public rangeland below the plateau in the Paunsaugunt Area are seriously depleted and virtually unproductive. Much of this land is laced by active channel and sheet erosion. One might conclude from the viewpoint of private investment that range rehabilitation there is out of the question because grazing values cannot justify such expenditure — that the

land is unproductive and useless. But the loss of soil from the watershed is only part of the cost to society. Every acre-foot of soil swept away contributes to the eventual demise of Lake Mead or to the impairment of other facilities. Much of the land under erosion in the Paunsaugunt Area drains into the Paria River and, in turn, into the Colorado, a major lifeline in the Southwest (fig. 4). This fact changes the whole complexion of range management problems in this part of the Paunsaugunt Area. The Paria River, carrying one-sixth of its volume in sediment, is one of the most heavily silt-laden streams in America.

Unless it is checked, sedimentation from the Paria is a direct threat to two important structures: (1) It could significantly reduce the usable storage of the proposed Marble Canyon Reservoir in 40 to 50 years, and (2) it could adversely affect the tail water from Glen Canyon Dam and reduce its powerhead. It is quite clear from this example that the responsibility of the land manager extends far beyond the confines of his management unit and far into the future.

The long-range implications to the Southwest are inestimable. This close association of range and watershed problems is but one example of the many interrelations among resource uses that are a part of areal multiple use analysis. Management necessary to achieve maximum production of a given resource in an area may increase or decrease production in other resources. For each resource, the amount of these effects on the others should be estimated. Once these relative potentialities have been determined, they can be weighed against projected demands, costs of production, and the flow of benefits, to help the manager determine a course of action.

**The flow of benefits.**—Benefits may flow from the resources in terms of dollar values or in some intangible form. To recognize and weigh only dollar values is quite misleading. Dollar and other values are, in fact, inseparable. Intangible values contribute to economic growth by stimulating human energies, which are thus released into the social economy. This comes in addition to the intrinsic value to the individual involved.

The importance of considering values other than those expressed in dollars is recognized in the two multiple use Acts cited early in this paper. Those documents require that consideration be given to the "relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output."

One of the virtues of the area-oriented approach is that intangibles, despite our inability to measure them adequately, take on a dimension of reality. The mention of in-

tangible value often brings to mind such uses as fishing, hunting, camping, and other outdoor recreation. But some degree of intangible value is associated with all resource activities. For example, cattle raising is commonly considered to have a definable market value. However, a critical audit of the books of many stockmen in the Paunsaugunt Area probably would reveal that in terms of dollars alone these men are fighting a losing battle, partly because of forced livestock reductions resulting from poor range conditions. To most of them, raising cattle is only a secondary source of income. Yet, they justify continuation of their marginal operation on the basis of enjoyment, or of the security of having a few cows on the range. Being a cowboy may not always bring in much money, but it apparently buys a lot of satisfaction.

In appraising the growth opportunity of an area, the public land manager must consider not only the value of resources at the point of production, but how much and where these values expand through the economy. To appreciate the influence of the various resources on the economy, the resource planner should have some information on (1) the multiplier effect on income through the use of each resource, or on the product value and value added by processing of each resource, and (2) the distribution of wealth generated.

Figure 7 shows the estimated relative dollar value of the five wildland resources

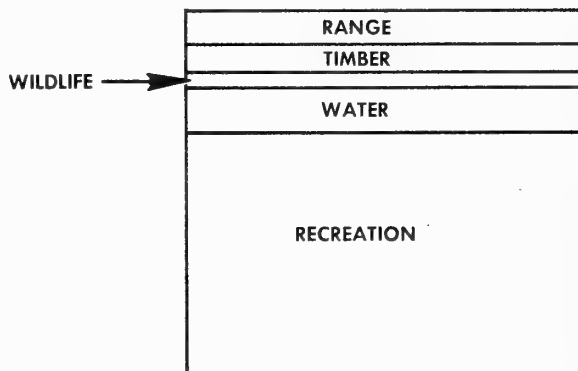


Figure 7.—Relative dollar values of Paunsaugunt Area resources at point of harvest, 1962. These are tentative estimates and are introduced here only for illustration.



Figure 6.—Many cattlemen run fewer than 50 head, and nearly all operators work off the ranch for their main source of income. The roundup often becomes a family activity.

taken at the point of “harvest” from public land in the Paunsaugunt Area for 1962.<sup>6</sup> To compare benefits only at this point would be misleading.

As the resources move into the economy, some interesting patterns emerge (fig. 8). Timber values, and especially water values, expand many times. Only a small part of the value generated by water is realized in-

side the Paunsaugunt Area. Most of it is realized outside the State. Timber also generates the larger part of its value outside the area. Most of the wildlife values benefit people living outside the area, while a large part of the livestock money stays to support the local economy. All of the dollar value shown for recreation is realized in the immediate area. The wealth generated by Bryce Canyon beyond the Paunsaugunt Area was not estimated.

The purpose of the foregoing summary of dollar values is twofold. First, it suggests the importance of considering values of the various resources beyond the point of har-

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<sup>6</sup>Dollar value realized from timber delivered to the mill, the sale of cattle from the range, and local expenditures by hunters and by tourists. The estimate for water at this point is indicated by imputed values for irrigation and domestic use.



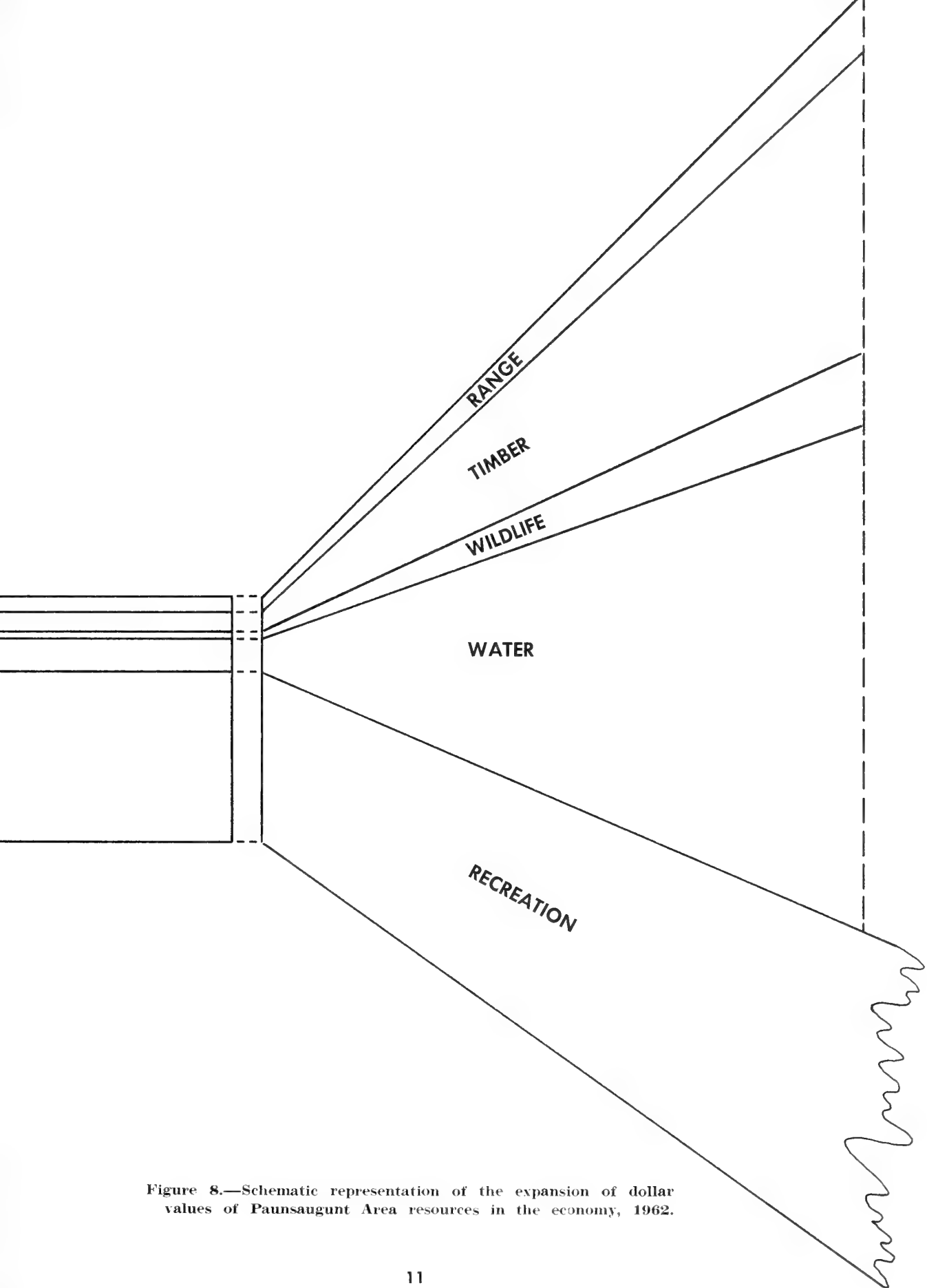


Figure 8.—Schematic representation of the expansion of dollar values of Paunsaugant Area resources in the economy, 1962.

vest. Here we see timber and water values expand many times from the point of harvest, while wildlife and range forage expand at a much lower rate. In other words, a dollar's worth of harvested timber or water may contribute more to the national economy than a comparable unit of other resources. We also see the tremendous influence of an important recreation industry; the dollar-generating power of Bryce Canyon indicates the potential of much of the canyon country in southern Utah. Second, it indicates the need for considering *where* dollar values are generated. The value added to the local economy by some resources may be much greater than that added by others. For example, in the competitive situation between cattle and deer, so common in this region, it is well to note that even though deerhunting may generate more wealth, it may be of relatively little value to the local community compared to the livestock industry, which has great local significance.

If we compare the total wealth-generating capacity of water with that of other resources, it might seem that any decision between water production and production of range forage or timber, for example, should automatically favor water. However, such a conclusion is not so easily drawn when one considers the social economy of the Paunsaugunt Area, which is heavily dependent on the livestock and timber industries.

It should be emphasized that these figures do not pose as a final tally on dollar values of resources from the Paunsaugunt Area. They are used merely to indicate the need to evaluate the influence of various resource uses in a broad spectrum of wealth generation and distribution.

#### **Trends, potential influences, and demands.—**

To simplify analytical procedures there may be a temptation to pickle time — that is, to ignore the element of change. In a constantly evolving world, resource planners cannot afford this luxury. To provide for future needs they must evaluate trends and shifting patterns in resource use, and the possible impacts on the area of developments that are taking place both inside and outside. Then

the difficult question of projected demands may be tackled.

For example, the growing importance of southern Utah to the Southwest and particularly to southern California is a key factor to be considered in the Paunsaugunt Area, not only in connection with the water resources, but in regard to tourism and recreation, fishing and hunting, and even timber production. Nonresident deerhunters, mainly from California, have increased five-fold since 1957 and now exert more than half the hunter pressure in this area. Utah now ranks fourth among the 50 States in the number of nonresident hunting licenses sold (1962).

Several outside developments now underway will have a tremendous effect on the economic activity of southern Utah in the years ahead. Perhaps the most important of these to the Paunsaugunt Area is Glen Canyon National Recreation Area encompassing Lake Powell. One of its large recreation sites (Hole-in-the-Rock) will be accessible by paved road only through the Paunsaugunt Area (fig. 4). Construction of a surfaced highway through Cottonwood Wash near the Paria River, linking Page and Panguitch, and cutting 40 miles from the distance between Salt Lake City and Page, could have a remarkable effect on the Paunsaugunt. Completion of Interstate 70 across a remote desert in east-central Utah will shorten the distance between Denver and Los Angeles and direct more traffic to the southern end of Utah. These and other projects will increase the flow of new money into the area and create new demands on the land.

Estimation of future demands for an area is not an easy task. It could be aided, however, for some resource uses if national demands could be suggested and then divided up by regions. The objective for a State, province, or area could thus be approached with more confidence.

**Institutional structure.**—Finally, relative to the fourth group of factors, a realistic management plan must work within the existing institutional framework or seek to modify



**Figure 9.—Southern Utah has become a popular hunting ground for increasing numbers of Californians. Rapid population growth, new interstate highways, and other factors suggest a continuation and perhaps even an acceleration of recreational use.**

it in order to be effective. For example, federal agencies “manage” the wildlife habitat while the State controls harvest of the game. There are several land ownership problems, one of which is that the Forest Service operates summer range while the Bureau of Land Management operates winter and spring-fall range. Use of National Forest and BLM range is closely related, yet coordination is slight. Another problem arises from fragmented patterns of land ownership. Even

within agencies the necessary division of functional responsibilities presents certain problems. These and many other constraints point up the need for greater cooperation in planning and action between and within the various land management agencies and private interests. Hopefully, as more information is gathered and the interdependence of various groups and resources is more clearly demonstrated, some of the difficulties can be lessened.

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## SUMMARY AND CONCLUSIONS

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The primary intent of this paper has been to demonstrate the need for an areal analysis and to broadly categorize and discuss the factors involved in the multiple use management of public lands. An outline for organizing these factors into report form for a specific study area, such as the Paunsaugunt, will appear in subsequent papers. The few examples selected above are only for illustration. Recognition of both intangible and tangible facets of value and the effects of space and time have been stressed.

The aim of areal multiple use analysis as suggested herein is to provide a framework in which available information of importance in the management of a given unit of wildland can be arranged, analyzed, and evaluated for the making of sound decisions. Presently, there is a great deal of useful information which is not easily accessible to the land manager or is not readily applied to his particular area of responsibility. Use of this method should help to close this gap between resource research and problems on the ground. There is a growing need for closer correlation between lands of different ownership and management, in analysis and planning, funding, and action.

Areal analysis is not intended to replace any other form of research, but rather to

complement it. Indeed, it relies on other types of multiple use analysis and studies in other fields — physical, biological, economic, and social — for basic data and relationships. However, it is felt there is a need to pull these things together as they apply to particular communities. Only by delineating an area of study can resources be inventoried and analyzed for the purpose of planning and management. Only in an areal context can the dynamic interdependence between the local community and resources and the broader setting be understood. Only in this way can the distribution of values and the reality of intangible values be appreciated. And in an areal context the findings of resource-oriented studies can be made effective.

If well chosen and defined, a study area may fairly well represent the conditions of the province and allow the extension of general findings and recommendations across other areas of the same province. In places where use patterns are complex, the opportunity to extend results from one area to another may be more limited.

A study based on considerations suggested in this paper should help the public land manager identify his responsibility through broader understanding of the issues involved and how to resolve them.

Headquarters for the Intermountain Forest and Range Experiment Station are in Ogden, Utah. Project headquarters are also at:

Boise, Idaho

Bozeman, Montana (in cooperation with Montana State University)

Logan, Utah (in cooperation with Utah State University)

Missoula, Montana (in cooperation with University of Montana)

Moscow, Idaho (in cooperation with the University of Idaho)

Provo, Utah (in cooperation with Brigham Young University)



## FOREST SERVICE CREED

The Forest Service of the U. S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing nation.