

**CANADIAN PARKS IN  
PERSPECTIVE**

---

*Based on the conference*  
**The CANADIAN NATIONAL PARKS**  
**TODAY AND TOMORROW**  
**Calgary, October 1968**

**Edited by J.G. Nelson**  
**with the assistance of R.C. Scace**



---

## RESEARCH NEEDED FOR NATIONAL PARKS

ROBERT C. LUCAS\*

National parks are complex entities, and in selecting and administering them we could draw upon an immense range of knowledge from a wide array of scientific disciplines. Most national parks have sections that run the gamut from wilderness to small cities, and the research needs are just as wide-ranging.

First, we might ask if it is really worthwhile to try to list and organize all these research needs. With so many little-studied questions in the air, would we not be as well off with a more or less random choice of topics based on chance interests of researchers, accidental contacts, scientists' vacation plans, and "crash programs" when crises develop? Do we even know enough to assign research priorities? And if we do, do we have enough research manpower available, that is flexible enough to concentrate on high priority subjects?

I will leave some of these questions unanswered for now, and just point out that a relatively small research effort on such a wide variety of possible topics probably makes an attempt to concentrate and relate studies all the more necessary. Even if most individual research studies cannot be directed to high priority topics, there is something to be gained by increasing each scientist's awareness of the relation

\*Robert C. Lucas is Principal Geographer at the Intermountain Forest and Range Experiment Station; he is located at the Forestry Sciences Laboratory on the University of Montana campus at Missoula.

of his study to the whole system. Such awareness could both improve the study and make its interpretation in terms of park planning and management more effective.

#### PARK GOALS AND RESEARCH NEEDS

Research for national parks should be determined by park planning and management needs. Planning and management provide the essential perspective that defines research needs and suggests priorities for various lines of investigation.

The kind of management decisions involved in selecting and managing national parks, in turn, derive from general park goals. Two major goals are usually cited for national parks. One is the preservation of natural conditions. The other is provision for the enjoyment of these natural conditions—in other words, a special kind of outdoor recreation, using the term recreation in the broad sense of inspiration, aesthetics, and so on. There are other benefits to be gained from the maintenance of natural conditions, such as providing living museums, reservoirs of biological material, subjects for research, aids for teaching, and so on,<sup>1</sup> but many other areas also serve these purposes<sup>2</sup> and they are probably secondary to enjoyment of natural conditions in national parks.

The two major goals are in tension.<sup>3</sup> The particular kind of enjoyment a national park is meant to provide apparently depends on the natural quality of the environment. But enjoyment is impossible unless people visit the park, and people make an inevitable impact on natural conditions. Yet, the two goals—preservation and enjoyment—seem inseparable and, in fact, might be considered as one.<sup>4</sup> The tension between the goals must be managed rather than eliminated by concentration on either preservation or enjoyment alone. Neglect of either goal would seem to miss the national park idea. At one extreme, nature could be totally preserved for its own sake and no visitors allowed. This would do away with all enjoyment except the indirect satisfaction that might come from knowing an area was preserved. At the other extreme the park could become a general recreation area, but the natural conditions would be largely lost, and the special sort of enjoyment they afford also would be lost.

The national parks of Canada and the United States have similar goals and share most research needs. In fact, national parks share a great many research needs with other sorts of recreation areas. Both the national park wilderness and the developed, intensively used portions of parks have counterparts elsewhere. The Wilderness Act (P.L. 88-577, 1964) applies to both national park and national forest wilderness in the United States, emphasizing their similarity. Many provincial parks in Canada and a few state parks in the United States contain wilderness that differs from the national parks little more than the national parks differ from one another. The problems and research needs for national park campgrounds, roads, sanitation systems, and other facilities are shared with many other recreation areas, as are questions of interpretive efforts, recreation economics, and so on. The national parks, because of their complex nature, probably could supply examples of almost every type of recreational question. The combination of natural conditions and substantial recreational use, and the tension between them, is the most nearly unique characteristic of the national parks, and many of the most urgent research needs fall here. But even this tension is not limited to national parks. This commonality underlines the need for co-ordinated research that draws upon related studies of areas under many jurisdictions. This paper will discuss research in terms of national parks but the ideas should have wider applicability.

The national park goals of preservation and enjoyment suggest three key parts of the whole interrelated system, each with its associated research needs: first, the natural environment itself, and the effects on it of use and management; second, the visitors, and their interaction with the environment, with each other, and with management programs; third, the interaction of areas and forces outside the parks with parks, park use, and park management. Research on these three topics relates to park selection, to the development of policies to achieve general goals, and to management actions.

All of these topics are dynamic. They need to be studied as processes operating over time. Trends must be described and projections made. Some management decisions require

information about the past and many programs would benefit from a clearer historical view.

Each of these three research topics requires some discussion of what it includes and how it relates to management.

### RESEARCH ON THE NATURAL ENVIRONMENT

#### *Inventory*

The current natural environment needs to be inventoried objectively and in detail.<sup>6</sup> Vegetation is probably the component of the natural environment most in need of being inventoried. Vegetation is fundamental to animals as their habitat, it can be altered greatly and quickly by man as land forms cannot be, and it is a major part of the scenery. But animals, water, and other components also need to be inventoried. An inventory has value for many management purposes (protection, locating developments, interpretation, etc.). It serves as a base for judging any management action. It is also an essential base for many sorts of biological research.

#### *Historical Ecology*

It has been suggested that the national parks in the United States aim for a "vignette of primitive America," which would require that "the biotic associations within each park be maintained, or where necessary recreated, as nearly as possible in the condition that prevailed when the area was first visited by the white man."<sup>7</sup>

This concept could be misinterpreted as striving to hold a park as it was on the day the first explorer topped a ridge and gazed at it.<sup>8</sup> The objective seems to be rather to come as close as possible to the sort of scene that nature would have provided without modern civilization's influence. Change would be a recognized, accepted, and desired part of this scene. The static "snapshot," in fact, would be completely unnatural, and impossible to achieve.<sup>9</sup>

Historical ecological research is needed, then, not to describe plants and animals in detail for each specific site as they existed on some historic day (which may have been generations before civilization made any imprint on the area), but rather to suggest what the typical natural conditions might be without technology's influence and how conditions

varied as nature's rolls of the dice came up one way or another.

Probably only a few sheltered spots are still entirely in the natural, unmodified state. This requires that earlier conditions be investigated by historical methods and by biological sleuthing from clues in long-lived trees, snags, fossils, evidence of plant succession, and so on.<sup>10</sup> Even if present conditions were unmodified, knowledge of natural variability would be enhanced by historical information.

#### *Forces of Change*

The forces that produced the natural conditions and the changes in these conditions need to be assessed as well as the modern influences. Some natural influences were relatively constant—soil and climate, for example. Some processes were continuous and fairly gradual—growth and death over time, particularly, and even evolution itself. Other relatively infrequent and irregular forces were very powerful—fire, flood, windstorm, avalanche, and insect and disease epidemics. The modern influences include the natural forces, although often in modified form, plus recreational use, trampling livestock, exotic plants, insects and diseases, extinctions, drainage of adjacent land, and many more.

#### *Comparing Present Conditions with Natural Conditions*

With the sort of information discussed so far, it would be possible to compare the present condition of a park with a reconstructed picture of its natural condition, both in terms of plant and animal communities and the forces that make up their environment.

Furthermore, projections of future change under the continued status quo could be developed and compared to the natural situation. This comparison is not quite like pairing up two maps or photographs and checking them point by point. It is more a matter of holding up the present situation against a statistical normal distribution of past natural conditions to see how far the present deviates from the mean, how atypical it is, or whether it even belongs to the same class at all. Using trend data, it could be determined if the park was moving toward more typical natural conditions or

farther away. These same questions could apply to potential new national parks.

*Developing Ecological Management Techniques*

If these comparisons show that the goal of maintaining natural conditions is not going to be achieved under the present management, plans could be made to reintroduce missing or reduced influences, or to find substitutes for them, and to minimize or eliminate man's effects, or to take steps to counteract these effects. For potential parks the magnitude of the restoring or healing task could be weighed.

This is not a simple task. The goal of maintaining or restoring natural conditions can only be sought, never fully achieved. For example, the extinct passenger pigeon cannot be returned and white pine blister rust introduced from Europe probably cannot be eliminated. Influences from surrounding land may be reduced but not excluded.<sup>11</sup> Complete isolation is impossible. The phrase, "a vignette of primitive America," suggests this since a vignette is a picture that fades at the edges.

Fire is probably the most altered influence. It was a major force in natural ecology, destroying and creating, and producing what the first explorers found in most places.<sup>12</sup> Modern fire control is very effective, with radios, airplanes, parachutes, gasoline engine pumps, bulldozers, chemical retardants, infrared scanners, and so on, as tools. As a result, fire has been greatly reduced as an ecological force for the last generation or so. But a complete hands-off approach to fire control in parks is also out of the question. Danger to lives and adjacent areas dictates some sort of control, and the parks and wilderness areas are too small a remnant and too valuable for us to allow a very large part to burn at one time.<sup>13</sup> Furthermore, where fire has been excluded for decades, fuels may have built up conditions for an unnaturally severe fire.

The challenge to research and management is to develop the ability to let fire approximate its natural role as closely as feasible. We need to learn to control the unwanted effects of fire while allowing it back in the ecosystem. With better knowledge of park fuels, fire danger, natural fire barriers, and new control methods, and with better weather forecasts,

park managers could consider letting at least some natural fires burn freely. The limitations inherent in this approach might suggest evaluating prescribed fires as a supplement," or ways of producing similar effects somehow without fire.

#### *The Need for "Managed Wilderness"*

Deliberate planning and action, such as in the example of fire, seem necessary to offset the unintentional or unavoidable effects of civilization. The alternative, often called "preservation," seems self-defeating. Since the "preservation" alternative usually excludes certain natural forces, especially fire, it produces not preservation, but sure, steady change to something unlike the North American wilderness. The fact that the goal, like almost all goals is not 100 per cent attainable is no reason for not trying; the impossibility of achieving perfect justice or health does not stop efforts to improve law or medicine.

To some people, human manipulation to create natural communities is philosophically unacceptable as a contradiction in terms.<sup>13</sup> Many other people, including a number of ecologists, accept the need for intervention.<sup>14</sup> The real choice seems to lie between unintended, accidental, inescapable man-caused change away from natural conditions, on the one hand, and conscious planning to minimize and offset man's impact, on the other. Obviously, some approaches to ecological management are preferable to others, and better knowledge can help us to find ways of working with nature, developing a light touch and sensitivity, but total non-interference is simply not one of the choices, whether we like it or not.

The problem of offsetting man's direct impact, on campsites especially, is shared by national parks with many other sorts of recreation areas. Past research indicates that even light use produces large changes.<sup>15</sup> Better ways of choosing more durable sites, increasing site durability, restoring deteriorated places, and controlling visitor and horse use are needed.

#### RESEARCH ON RECREATIONAL USE

Recreational use poses a whole set of new, separate problems. I have already argued that "parks are for people," but in a special way. Sacrificing the quality of the park to

people not only destroys the park, it cheats the people also. Managing a park and its use to provide a special experience calls for knowledge of visitors and their interaction with the natural environment, with each other, and with management efforts.

Knowledge of people, their activities, and their ideas could help park managers make decisions about limiting the numbers of visitors, controlling or influencing what they do, or striving for less use of some crowded areas or more use of lightly visited areas; and decisions as to what sorts of roads, campgrounds, visitor centres, or trails to build, where to build them and where not to, whether or not to reintroduce fire in the ecosystem, or what kinds of information programs to provide. Evaluations of park needs and of the suitability of potential areas, and many other management choices could be improved by this knowledge.

This does not mean that policy need be dictated by the attitudes or responses of present visitors." An opinion poll or a use survey is not a simple, direct prescription for management. Visitors' desires may be impossible to fulfil, short-sighted, selfish, or in conflict with others' ideas or with basic policies. Both attitudes and behaviour of visitors may be based on misinformation, may be changeable or capable of being changed, may be different from those of potential visitors, and may fail to reflect those of the dissatisfied "dropouts." Even with the best survey techniques, what people say does not always indicate what they would actually do. Attitudes and perceptions need to be analyzed and interpreted in a broader context and related to ecological knowledge and park objectives, but they cannot be ignored.

I will try to discuss visitor studies under three headings: use patterns, use quality, and values. The three topics overlap; all involve studying human behaviour and the factors associated with it. The term "use" is employed rather than "recreation" to make it clear that the whole experience is of concern, whether it is considered recreational, inspirational, educational, or aesthetic in nature.

#### *Use Patterns*

We need a basic description for recreational use, as we did earlier for the natural environment. How much of what kind of use takes place where and when? Measurement

methods need further development, but head-counting alone is not enough; knowledge of the activities or behaviour that make up the park experience are also needed, as well as a description of visitors in social and economic terms.

Very uneven use patterns seem common in many recreation systems.<sup>19</sup> The distribution of use can be considered on many different geographical scales—between parks in a system, within a single park, and within a single area or development within a park, such as a campground. Wide variation in use is characteristic of all of these scales, and poses important management problems.

Within the national park system in the United States (excluding Monuments, Parkways, Seashores, etc.), parks vary from well over 6 million visits down to about 10,000—a 600-to-1 range.<sup>20</sup> National forest wilderness areas vary through a range of more than 1,000 to 1 in use.<sup>21</sup> Some of this variation may be a fairly clear expression of limited appeal or remote location, but many of the differences are not easy to explain with any accuracy. Planning for the future in existing areas and assessment of potential parks would be made easier if planners understood the various factors in drawing power and how changes in them may affect use.<sup>22</sup>

Use varies within a particular park or related area, also. Some campgrounds, lakes, streams, roads, overlooks, and trails are heavily used while others are not. Part of this variation is inevitable, and some of it is probably desirable (since people's objectives and areas' capacities both vary), but often the imbalance makes inefficient use of capacity, and reduces the quality of the experience. We do not really understand the basis for this variation; if we did, presumably the capacity of developed sites, at least, would have been matched more closely to use potential. If park managers wish to disperse use more evenly, they need to know which factors affect drawing power, and how strongly, and how they interact. In a program to move accommodations outside parks, knowledge of how and why people choose places to stay would surely be helpful. The ultimate objective would be sufficient knowledge to predict site use accurately enough to guide efforts to influence use distribution.

Some factors are not subject to control, however. This would be true, for example, of topography or the size of a lake. Some types of manipulation of factors influencing use, for example stocking fish, may be inconsistent with national park objectives of maintaining natural conditions.<sup>23</sup> If variables that can be altered by management, such as road design and location, access, and information, do not influence use strongly enough to achieve the desired use patterns, direct regulation would need to be considered. Research to predict the response to different sorts of regulations or fees would then be necessary.

Use can also vary greatly within a single recreation development, such as a campground,<sup>24</sup> in ways that may be inefficient and hard on the resource. The reasons underlying this location behaviour also need study to enable planners to reduce extreme variation in use intensity.

Better knowledge is also needed of the basis for the type of activities people engage in, and the times at which they participate.<sup>25</sup> These aspects of use need to be studied in relation to the characteristics of both people and environment, including not only the physical resources but also management, information, fees, and similar matters. A basic social and economic description of park users—a sort of census—could help in relating studies of one park to others.

Use patterns—amount, type, timing, and location—are influenced by people's objectives and by what they know and think about the park environment, rather than directly by the environment itself.<sup>26</sup> Studies of what people do and also of what they say about their objectives, awareness, and attitudes are essential for understanding and managing use, and even more so for management directed at the quality of the experience.

#### *Use Quality*

High quality is, or should be, the essence of the visitor's experience in a national park. This is a special kind of quality and it must be measured against park goals. Measurement of quality, even imperfectly or indirectly, is a critical need.<sup>27</sup> Imaginative approaches are called for, probably drawing upon disciplines such as psychology and the developing techniques of the behavioural science-oriented architects and designers. Satisfaction is part of the quality of a park visit,

but not all of it. The depth of involvement, the learning, the changes of attitudes that may stem from a park visit should also be included. Measurements such as these are the essential yardstick of success (or failure). In their absence, as now, we can only count visitors and visitor-days. Yet, the total recreational output from a national park should be defined as the number of visits times the quality per visit. Quality is not constant, and quantity alone can be a treacherous guide to decision making. More use does not necessarily mean more output; a lake producing 2,000 carp is not producing more than one with an output of 1,000 trout by recreational standards.

Quality may be inferred partly by what people do, and which areas and activities they choose. This sort of interpretation could come out of the use analysis discussed above, and must draw upon it, since other factors, such as access, must be held constant if inferences as to preference are to be drawn from choices. Quality also may be judged by park experts, perhaps by a panel of independent appraisers." Finally, visitors might be questioned, perhaps both before and after, using psychological attitude scales, and so on. All of these approaches have shortcomings, and probably some combination would serve planning needs best.

Some important factors in providing high-quality national park experiences may include the resource base or natural environment, use type and intensity, facilities, experience, knowledge, and tastes—and the social setting in which use takes place.

Research is needed on visitors' (and potential visitors') knowledge, attitudes, preferences, and responses to the natural environment, and their responses to man's influence on the environment. Even if it were assumed that the environmental management goal were set by ecological considerations alone, knowledge of people's preference could indicate needs for explaining or interpreting conditions and changes. Also, the "ecological prescription" is likely to have some leeway or include some range of conditions that would be equally natural. In this case, knowledge of the relative attractiveness or interest of alternative acceptable natural environments could be helpful.

It seems unlikely, however, that ecology can be a completely sufficient guide. The dual nature of the park goal—the maintenance and enjoyment of natural conditions—suggests that people's ideas must be included. Absolutely unmodified nature appears impossible, policy statements to the contrary notwithstanding, especially if parks are visited and enjoyed. Some modification is inevitable, but how much is acceptable? In part at least, acceptability depends on visitors' standards. How much wear and tear on soil and vegetation can take place before the quality of the visitor's experience is affected? How is "deterioration" defined by the public? How is "natural" defined? Some parks, especially in eastern Canada and the United States, have been very much modified by past uses, such as logging and agriculture. This is a matter of historical record and obvious to the trained observer, but how much recovery must take place before most visitors will consider the scene natural again?<sup>20</sup> The relation of this kind of information about attitudes to interpretative programs is important, and will be stressed in several instances below.

Research on carrying capacity, or the optimum intensity of use, is much needed. How much use is too much? How are quantity and quality related? The visitor's perception of crowding and his response to it undoubtedly varies greatly between people and parts of a park.<sup>21</sup> The use standard that is appropriate on the roads and at visitor centres is probably very different from that of the back-country trail. Some degree of solitude may be a particularly important part of the park wilderness experience, as the U.S. Wilderness Act suggests, and the decline in the quality of the wilderness experience with increasing use intensity might set an even lower capacity for a particular area than would be indicated by ecological guidelines. Raising the capacity of the wilderness portion of a park will probably be much more difficult than expanding the capacity of the developed part, since wilderness capacity is largely a function of land area, whereas the capacity of developed sites is relatively more dependent on capital inputs than on land. As a result, regulation of use may be more necessary in the wilderness.

The quantity-quality issue must be related not simply to visitor enjoyment but to the quality of the experience in

terms of park goals. Some visitors may accept or even prefer the hubbub of a crowded park. But, crowding beyond some point may reduce the quality of the contact with nature that is the park's reason for being. This issue seems critical, even if some visitors are seeking something else and do not object to heavy use. The national park, like any other recreation area, serves and is intended to serve only a part of the wide range of varied outdoor recreational opportunities, and it must not lose sight of this.<sup>22</sup> Research can help management by defining visitors' objectives better and suggesting needs for alternate areas or visitor education. Key questions are: which kinds of visitors and which kinds of use are most dependent on the specifically national park qualities of the environment, and which could actually be accommodated better elsewhere from the viewpoint of both the park and the visitors?

Beyond the question of amount of use, do certain types of use interfere with the kind of enjoyment the park is intended to provide without themselves producing this particular kind of experience? Water-skiing and speed-boating might be suspect, for example, and visitors' attitudes and responses to such uses should be investigated.<sup>23</sup>

The last set of critical attitudes focuses on management programs, including construction, regulations, fees, information programs, and so on. Attitudes concerning facilities, size and layout of campgrounds and other developed sites, trail and road standards, building design, and the like need to be studied in relation to park goals. For example, completely divided, double-track road systems have been proposed as a way of coping with heavier park traffic while providing a sense of close contact with the natural scene.<sup>24</sup> The two lanes could usually be out of sight of each other, they could be narrower, with more curves and less extensive cuts and fills, and reduce the distracting tension of watching for oncoming traffic. Techniques for evaluating roadside scenery are fairly well developed<sup>25</sup> and could be useful in testing the extent to which one-way roads change the visitor's perceptions of the landscape and his reaction to it. The same approach could be used to evaluate novel modes of transportation, such as monorails.

Research on the effects of regulations and fees should provide knowledge not only on the quantity of use discussed before, but on its quality as well. What kind of use would be encouraged or discouraged by various policies, and how would these changes relate to park goals? For example, how does length of stay (less than a day and a half on the average in U.S. national parks), relate to the quality of the visitors' experiences? Are short stays superficial and incapable of meeting park objectives? Perhaps a *minimum* length of stay is as desirable as a *maximum* limit. At the least, it would be useful to have information on the effects of encouraging longer stays and deeper involvement as against hurriedly "doing" as many parks as possible through a windshield.

Information and education programs are the major alternative to regulations and probably a preferable alternative to most people. A better understanding of the audience and of various ways of communicating with them could be useful. What sorts of visitors with what sorts of prior knowledge and experience are reached by different approaches, and who is missed? How much can behaviour be influenced by education and interpretation? Is it possible to improve the visitor's experience and reduce inappropriate and incompatible activity through information programs?

If ecological research points to a need for some reintroduction of fire, how will the public react to this? Has a generation of effective fire prevention publicity created a rigid, negative opinion, as did the campaigns for buck-only deer laws in some places? Or are visitors, who probably are generally above average in education, already partially aware that fires are not necessarily unnatural or undesirable in all situations? How well would they grasp explanations of the difference in the role of fire on lands managed for park and wilderness values rather than for timber or other commodities? This issue exemplifies well the need for attitude research to go beyond describing current attitudes. Knowledge is needed on who thinks what, how strongly, and why they feel as they do. How do experience and background affect ideas? How can ideas be changed through education, exposure, and time?

One last example will suffice for this section. How does the administrative use of mechanical equipment, such as helicopters, chain-saws, and bulldozers, affect the quality of the national park experience, especially away from the roads? It has been proposed that park managers use helicopters in place of horses in the back-country, since horses are destructive of the physical environment.<sup>37</sup> But, how many visitors who would watch an approaching packstring with interest and a sense of fitness would feel that the day had been shattered by the intrusion of a noisy "chopper"? In a national park or similar area this is a relevant question just as much as what ironshod, half-ton horses do to meadows. Again, how much could education shift opinions?

#### *Values*

Studies of the value of the flow of services from national parks are also needed. The value of visitors' experiences, the symbolic values to non-visitors, and the scientific-educational values seem to be the main sorts of benefits. Values include economic estimates such as simulated market values and possible psychological and physical benefits. These need to be studied as they are affected by management and policy alternatives, not just described as a whole. This sort of information could help in setting park policies and plans, in assessing potential areas, and in determining the benefits from additional parks.

#### RESEARCH ON THE RELATIONS OF PARKS TO OTHER AREAS AND ACTIVITIES

No national park exists in isolation, and many aspects of its relations to other areas and activities pose important research questions that will not be answered if research attention is limited to the parks themselves.

#### *Relation to Other Recreation Areas*

One of the most important needs is to view a national park in relation to other parks and recreation areas as part of a total, interconnected system.<sup>38</sup> This would include the park's relation to all the recreational opportunities and areas in its region, and to alternate or substitute areas in the whole system of a country or even a continent.

With regard to the park region (which should be defined as a relatively large region for places of national and international significance, such as national parks), the key questions involve the role of supplementary areas and facilities, such as commercial accommodations, state parks, reservoirs, ski areas, and so on, in relation to particular national parks. Light could be shed on this question by a better understanding of interrelations between parks and their regions in terms of present use patterns and by studies of the knowledge and attitudes that underlie use patterns. A key question is how much current park use takes place either because of a lack of alternatives or a lack of knowledge of them. This applies particularly to types of recreation whose appropriateness in national parks is questionable.

Research on the availability of recreation resources in the region would also help. In addition, general outdoor recreation research that would aid in defining recreation resources and resource quality for particular purposes could contribute to improved national park planning. In fact, any research that leads to better overall outdoor recreation planning is certain to benefit national park planning as well, because of the close interconnections between parks and other recreation areas. How a particular park or potential park fits into the system of similar areas is also important. How much alike are various parks or related areas? Are they really one system and substitutes for each other to some extent, or is uniqueness in character and appeal more the rule? How does location affect the ability of one area to substitute for another? Can gaps in the system be identified objectively?

*Relation to General Living Conditions*

A national park is related not only to other recreation areas, but to the beauty and liveability of the whole country, and especially of the cities where most people live. "At Yosemite the tremendous weekend influx of visitors from Los Angeles . . . is as much a commentary about the limitations of the environment of Los Angeles as it is about the attractions of Yosemite."<sup>3</sup> It has already been pointed out that the overall relation of parks to social and economic characteristics of society and to population location and trans-

portation systems needs to be studied, particularly for projecting demands and planning future park areas.

*Economic Impact*  
National parks are not established to subsidize the economy of underdeveloped sections. Parks have their own and different justification. If an economic boost is what is needed, there may be better ways to achieve it. Still, some national park proposals are presented and defended in these terms (incidentally producing a difficult trap to escape from if later efforts to protect the park and the park visitors' experience become necessary).

However, no decision on national park or related area establishment or management can ignore costs and benefits, no matter how lofty the ideals. National park proponents often resist economic analysis, partly on the grounds that park values are beyond price and probably partly because they associate economics with past anti-park propaganda. This is understandable, but it may be unfortunate. It is quite possible that thorough, objective economic analysis would be far more favourable to park, wilderness, and aesthetic concerns than many people suspect. Economic analysis does not need to rule out recognizing intangibles. In any event, economic analysis is as applicable to national parks issues as any other sort of scientific study.<sup>40</sup>

Benefits of park use have already been discussed under the value heading, but the effect on the regional and local economy should also be studied.<sup>41</sup> This effect may include both gains or indirect benefits to business, jobs, incomes, property values, and taxes, and on the other hand, losses or indirect costs caused by the exclusion of some activities, such as mining, logging, or grazing from the park.

There is also a need for research on the direct costs of various ways of planning and managing recreation systems. Recent research on United States National Forest campgrounds, for example, has cast some doubt on common ideas about the savings associated with large campgrounds.<sup>42</sup> The cost question is the other side of the coin on the question of quality as related to management programs. Both kinds of data are needed for decisions.

Economic analysis along these lines could help, at least in major resource allocation decisions such as the North Cascades or Redwoods. It is unlikely that simple answers can be provided, but the range of uncertainty could be reduced, and the value judgments focused on key factors. Studies in depth of more-or-less normal situations could help greatly in developing the objective methods needed to improve upon the "crash" studies rushed through after controversy erupts.

#### RESEARCH PRIORITIES

Assigning priorities is one of the hardest things we do. This is just as true in our own lives as in research. We could all confess our personal failures to assign priorities and stick to them. Some general aspects of priorities can be discussed, but any detailed assignments must be made relative to particular areas, their objectives, and their use.

The management problems associated with people may be more in need of early research answers than the ecological management issues. I see three reasons for stressing social research in the near future."

First, the human processes operate faster than the natural systems in most instances. Visits to national parks have been climbing rapidly for as long as statistics have been collected. Visits to United States National Parks have almost doubled since 1960. Attendance at Canadian National Parks has been growing even faster, about twelve per cent a year." Eventually, a slowing down and levelling off in attendance is inevitable—a continuation of past trends would require everybody to spend all of his time in the national parks before too long—but use may go much higher before any slowing down takes place. The effects produced on the parks by this use are changing just as fast. Impacts on the natural communities are also doubling every six or eight years. The experience of visitors is changing rapidly, almost faster than we can comprehend. Management decisions about developments, roads, accommodations, and so on, are compounding, and once made are very hard to reverse. In contrast to the rapid change in use and associated problems, most ecological changes are gradual enough to provide at least some grace period." Research on carrying

capacities and the quantity-quality relationship seem particularly in need of early study. Foresight is especially valuable in this situation; it is much better to set an upper limit on use before it is reached than to try to cut back on established use. Research related to redistributing use within a park or within a region is essential to implement any program of use control.

Second, there is less already known about the human questions. Much general ecological, wildlife, range management, and forestry knowledge now available bears on park natural environment management. Park managers' training generally is in these fields and the problems are more familiar and more tangible. An overgrazed meadow can be seen and measured with standard methods; visitor satisfaction cannot. Biological information also probably can be transferred somewhat more readily from one area to another and from one time to another than social data, which may more often need to be specifically tied to a particular time and setting, although general principles and theories should emerge from specific studies if these become more numerous in the future.

Finally, there is probably less relevant research underway at present on the social questions than on the biological problems. Without some added emphasis and support this will continue to be true. There also may be something of a "critical mass" effect. A small amount of research can hardly help but be scattered, with gaps that make the application to park management uncertain and inadequate. A major social research effort could lead to reinforcement of one study by another, and to a much more integrated body of knowledge.

On the other hand, there is an urgent need for park-related biological research, too, and this cannot be postponed without losses. Time marches on ecologically, and lost opportunities to describe earlier conditions and lay a base for measuring change are lost forever to a considerable extent. Historical research is inherently more difficult and less detailed than study of what is actually present; and historical study becomes harder and less precise as more time passes. What would we not give now for thorough, detailed records of park conditions 30, 50, or 100 years ago?

### ORGANIZING RESEARCH

I believe that a substantial research program with a mission of aiding national park planning is essential, and that some sort of research organization, or at most several such organizations with this central concern, are necessary to give continuity and leadership to research.

Mission-oriented or applied research organizations could carry out needed studies, particularly the broader, long-term research. They could also encourage and support needed research by others, especially university scientists, and seek to relate such studies to other research so that they add up, and are not just unrelated fragments. The research organizations could also serve park managers by acting as central reference services to find existing knowledge and interpret it in terms of park problems.

Present research efforts are very small in comparison with the importance of the problem, whether this is measured in employees, budgets, or broad social significance. If research could make possible even very modest improvements in park planning and management, this could easily repay the costs of a research program many times the size of the present effort. The parks and related areas are too valuable, and change is too rapid and too often largely irreversible to continue to settle for our present inadequate knowledge and reliance on intuition and guesswork."

### FOOTNOTES

1. Stephen H. Spurr, "The Value of Wilderness to Science," *Tomorrow's Wilderness*. François Leydet, editor, San Francisco, Sierra Club, 1963, pp. 59-75.

2. Federal Committee on Research Natural Areas, *A Directory of Research Natural Areas on Federal Lands of the United States of America*. Washington, D.C., U.S. Government Printing Office, 1968.

3. Enrique Beltran, "Use and Conservation: Two Conflicting Principles," *First World Conference on National Parks*. Alexander B. Adams, editor, Washington, D.C., U.S. Government Printing Office, 1964, pp. 35-43; F. Fraser Darling and Noel D. Eichhorn, *Man and Nature in the National Parks: Reflection on Policy*. Washington, D.C. The Conservation Foundation, 1967, pp. 13-19 point out that these two

goals of the "classical" national park cannot be rigidly applied to all parks. Some parks in long-settled areas, for example, Acadia and Cape Cod, really preserve a particular cultural landscape in much the manner of British national parks (H. C. Darby, "National Parks in England and Wales," in *Comparisons in Resource Management*. Published for Resources for the Future, Inc., by the Johns Hopkins Press, Baltimore, 1961, pp. 8-34). My paper focuses on the "classical" North American natural park, although most of the points made can be applied or reinterpreted to apply to parks featuring the man-made landscape as well.

4. U.S. Department of Interior, National Park Service, *The National Park Wilderness*, n.d. (1957?), p. 14.

5. U.S. Department of Interior, National Park Service, *Compilation of the Administrative Policies for the National Parks and National Monuments of Scientific Significance (Natural Area Category)*. Washington, D.C. U.S. Government Printing Office, 1967; Noel D. Eichhorn, "The Special Role of National Parks," *Future Environments of North America*, Fraser Darling and John P. Milton, editors. Garden City, N.Y. The Natural History Press, 1966, pp. 335-341; and, *National Parks Policy*, Canada Department of Indian Affairs and Northern Development, National Parks Branch, 1964.

6. M. L. Heinselman, "Vegetation Management in Wilderness Areas and Primitive Parks," *Journal of Forestry*, 63 (6):440-445, 1965.

7. A. Starker Leopold, et al., *Wildlife Management in the National Parks* (Report to the Secretary of Interior). Washington, D.C., Department of Interior, 1963. (Reprinted in *Sierra Club Bull.* 48(3):4-11 and *Living Wilderness*, 83:11-19, 1963.)

8. Darling and Eichhorn, *op. cit.* p. 54; Adolph Murie, "Comments on Leopold Committee Report," *Living Wilderness*, 83:21, 1963.

9. Spurr, *op. cit.*

10. Heinselman, *op. cit.* p. 444; Leopold, *op. cit.* p. 12.

11. Leopold, *op. cit.* p. 5; Spurr, *op. cit.*

12. Leopold, *op. cit.* esp. p. 13; Heinselman, *op. cit.*; Carl O. Sauer, "Grassland Climax, Fire, and Man," *Journal of Range Management*, 3(1):16-21, 1950; Daniel B. Beard,

"Plants and Animals in Natural Communities (and discussion), *The Meaning of Wilderness to Science*. David Brower, editor, San Francisco, Sierra Club, 1960, pp. 3-17, esp. p. 8; Richard H. Pough, "Wanted—Homes for Fire Species," *Sierra Club Bull.* 48(3):12, 1963; Stephen H. Spurr, "The Forests of Itasca in the Nineteenth Century as Related to Fire," *Ecology*, 32:21-25, 1954; The University of California Wildland Research Center, *Wilderness and Recreation—a Report on Resources, Values, and Problems*, Outdoor Recreation Resources Review Commission Study Report 3. Washington, D.C. U.S. Government Printing Office, 1962, pp. 287-292.

13. Darling and Eichhorn, *op. cit.* p. 54; Beard, *op. cit.* esp. p. 17 (comments by George Marshall); U.S. Department of Interior, *The National Park Wilderness (op. cit.)* pp. 26-27.

14. Leopold, *op. cit.* p. 13; Heinselman, *op. cit.*

15. Anonymous editorial, "Guardians not Gardeners," *The Living Wilderness*, 83:2, 1963.

16. Stephen H. Spurr, *Wilderness Management* (the Horace M. Albright Conservation Lectureship VI). Berkeley, University of California School of Forestry, 1966; Leopold, *op. cit.*; Beard, *op. cit.*; Heinselman, *op. cit.*; Darling and Eichhorn, *op. cit.*

17. Sidney S. Frissell, Jr., and Donald P. Duncan, "Campsite Preference and Deterioration in the Quetico-Superior Canoe Country," *Journal of Forestry*, 63(4):256-260, 1965; J. Alan Wagar, "The Carrying Capacity of Wildlands for Recreation," *Forest Science Monograph*, 7, 1964, p. 18.

18. Robert C. Lucas, "The Contribution of Environmental Research to Wilderness Policy Decisions," *Journal of Social Issues*, XXII(4):116-126, esp. p. 121, 1966.

19. J. W. Thorsell, *A Trail Use Survey: Banff and Yoho National Parks, 1967*, Recreational Research Report 33. Department of Indian Affairs and Northern Development, National Parks-Planning, 1968, pp. 7-12, ———, *Waterton Lakes National Park Visitor Use Survey, 1966, Part II: Wilderness and Recreational Use*, Recreational Research Report 24. Department of Indian Affairs and Northern Development, National Parks-Planning, 1967, pp. 17-20; Marion Clawson and Jack L. Knetsch, *Economics of Outdoor Recre-*

ation. Baltimore. Published for Resources for the Future Inc., by the Johns Hopkins Press, 1966, pp. 153-157; Minnesota Outdoor Recreation Resources Commission, *Parks and Recreation in Minnesota*, MORRC Report 12. St. Paul, Minn., 1965, p. 6; Robert C. Lucas, *The Recreational Use of the Quetico-Superior Area*, U.S. Forest Service Research Paper LS-8. Lake States Forest Exp. Sta., St. Paul, Minn., 1964, p. 33. Unpublished data from North Central Forest Exp. Sta., St. Paul, Minn., campground use as percentage of capacity varies between campgrounds in a ratio of from 5 to 1 up to 14 to 1.

20. U.S. Department of Interior, National Park Service News Release, "Park Travel up Five Percent in 1967" June 16, 1968. Great Smoky Mountains National Park reported 6,710,000 visits; Isle Royale 9,500. Visits per acre varied from over 2,000 to 0.02, or 100,000 to 1.

21. Unpublished Forest Service Recreation use information for 1967. Estimated use varied from 500 to 747,000 visitor days.

22. William R. Catton, Jr., *From Animistic to Naturalistic Sociology*. McGraw-Hill, 1966, New York, chap. 8, pp. 238-301; Donald J. Volk, "Factors Affecting Recreational Use of National Parks." (Paper presented at 1965 meeting of the Association of American Geographers.) Abstract published in *Annals of the Assoc. of Amer. Geog.*, 55(4):653-654, 1965.

23. Darling and Eichhorn, *op. cit.* pp. 56-61.

24. L. D. Love, *Summer Recreational Use of Selected National Forest Campgrounds in the Central Rocky Mountains*, U.S. Forest Service Research Paper RM-5, 1964. Ten per cent of the camping units observed were used almost constantly at the same time that about twenty per cent were never used.

25. For example, see the following: Eva Mueller and Gerald Gurin, *Participation in Outdoor Recreation: Factors Affecting Demand Among American Adults*, Outdoor Recreation Resources Review Commission Study Report 20. Washington, D.C., U.S. Government Printing Office, 1962; William R. Burch, Jr., "Wilderness—the Life Cycle and Forest Recreational Choice," *Journal of Forestry*, 64(9):606-610, 1966; \_\_\_\_\_, and Wiley D. Wenger, *The Social Character-*

istics of Participants in Three Styles of Family Camping, U.S. Forest Service Research Paper PNW-48, 1967; David A. King, *Characteristics of Family Campers Using the Huron-Manistee National Forests*, U.S. Forest Service Research Paper LS-19, 1965.

26. David Lowenthal (editor), *Environmental Perception and Behavior*. University of Chicago Department of Geography Research Paper 109, Chicago, University of Chicago Press, 1967, esp. pp. 1-3; also, the special issue, "Man's Response to the Physical Environment," *Journal of Social Issues*, R. W. Kates and J. F. Wohlwill (editors), vol. 22, no. 4, 1966.

27. J. Alan Wagar, "Quality in Outdoor Recreation," *Trends in Parks and Recreation*, 3(3):9-12, 1966.

28. Marion Clawson and Jack L. Knetsch, *op. cit.* p. 164.

29. Department of Resource Development, Michigan State University, *The Quality of Outdoor Recreation: as Evidenced by User Satisfaction*. Outdoor Recreation Resources Review Commission Study Report 5; Washington, D.C., U.S. Government Printing Office, 1962; William R. Catton, Jr., *op. cit.* chap. 5, pp. 124-254.

30. Elwood L. Shafer, Jr., "Forest Aesthetics—A Focal Point in Multiple-Use Management and Research," reprinted from *14th International Union of Forestry Research Organizations (IUFRO) Congress Papers*, 7, section 26, 1967. The discussion here is in terms of the "classical" natural national park, but if the objective is a particular historical, man-altered landscape, the question could be rephrased in terms of the closeness to this desired scene.

31. Wagar, *op. cit.* (Both "The Carrying Capacity . . ." and Quality . . ."); Robert C. Lucas, "Wilderness Perception and Use: The Example of the Boundary Waters Cance Area," *Natural Resources Journal*, 3(3):394-411, 1964; Darling and Eichhorn, *op. cit.* pp. 27-28; Michael Chubb, "Outdoor Recreation Land Capacity: Concepts, Usage, and Definitions" (Master's thesis, Department of Resource Development, Michigan State University, 1964).

32. William J. Hart, *A Systems Approach to Park Planning*. IUCN Pub. New Series, Supplementary Paper 4 (Morges, Switzerland: International Union for the Conservation of Nature and Natural Resources, 1966), esp. p. 33.

33. For one example, see Lucas, "Wilderness Perception..."
34. Bob R. O'Brien, "The Future Road System of Yellowstone National Park," *Annals of the Assoc. of Amer. Geog.*, 56(3):385-407, 1966.
35. Donald Appleyard, Kevin Lynch, and John R. Meyer, *The View From the Road*. The Technology Press, 1964, Cambridge, Mass.; Shafer, *op. cit.*; Sim van der Ryn and W. R. Boisey, *Value Measurement and Visual Factors in the Urban Environment*. College of Environmental Design, University of California, 1963; George B. Priddle, "The Man-Land Relationship When Pleasure Driving in Waterloo County, Ontario: A Proposal" (Processed research proposal; author is located at Waterloo Lutheran University); Robert H. Twiss and R. Burton Litton, "Resource Use in the Regional Landscape," *Natural Resources Journal*, 5(3), 1965.
36. Clawson and Knetsch, *op. cit.* pp. 272-285.
37. Darling and Eichhorn, *op. cit.* pp. 55-56.
38. Hart, *op. cit.*; David N. Milstein, "Systems Analysis for Outdoor Recreation," *Western Council for Travel Research Bulletin*, VI(3): 1-4, 1968. The importance of a regional viewpoint also has been stressed particularly by the National Parks Association, and rightly so, I think.
39. Darling and Eichhorn, *op. cit.* p. 78 (postscript by William H. Eddy, Jr.).
40. Warren C. Robinson, "The Simple Economics of Outdoor Recreation," *Land Economics*, XLIII(1):71-83, 1967; Clawson and Knetsch, *op. cit.* pp. 45-46.
41. For a discussion of the methods and problems of measuring the value and impact of a national park, see Norman H. Morse, *An Economic Evaluation of a National Park*. Wolfville, Nova Scotia, Acadia University, 1965; also, Clawson and Knetsch, *op. cit.* pp. 211-286.
42. Wendell Beardsley, *Cost Implications of Camper and Campground Characteristics in Central Colorado*. U.S. Forest Service Research Note RM-86, 1967.
43. Clawson and Knetsch, *op. cit.* p. 4.
44. Lloyd Brooks, "The Forces Shaping Demand for Recreation Space in Canada," *Resources for Tomorrow Conference Background Papers*, vol. 2, Ottawa: Queen's Printer, 1961, p. 965.

45. Heinselman, *op. cit.* p. 444.

46. Similar conclusions were reached by Clawson and Knetsch, *op. cit.* pp. 289-303. For an earlier view of the importance of related research, see Joseph L. Fisher, *Notes on the Value of Research on the Wilderness Part of Wildland Resources for the Future* Reprint 23, Washington, D.C., 1960.

THE UNIVERSITY OF CHICAGO

PHYSICS DEPARTMENT  
5300 S. DICKINSON DRIVE  
CHICAGO, ILLINOIS 60637  
TEL: 773-936-3636  
WWW.PHYSICS.UCHICAGO.EDU