To National Parks and the World

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The planet and the parks are in like ways suffering from similar overwhelming forces which threaten their very survival. Carrying capacities must be identified for both, and must become the regulating principle which guides the activities of man in the future for both entities.

National Parks do and must have something important and relevant to contribute to the betterment of our world society. Without doubt, the benefits derived in the forms of human pleasure, inspiration, education, scientific knowledge and ecosystem preservation are of great and measurable significance. These are some of the more obvious and traditional values that have historically justified the establishment and perpetuation of national parks. These values must continue to be recognized if parks are to survive in the future as viable entities.

But our world is rapidly changing and, moreover, the pace of this change is ever accelerating. As a consequence of the activities of man, more so by him than by any other force, the planet is experiencing some unnerving conditions: If current trends continue, these conditions will become all the more precarious for the well-being of all life in a relatively short time.

It has only been in very recent years that humankind has collectively become conscious of the great impact the species is exerting on the conditions of the planet. Without question, man, by his rapidly proliferating numbers and by his ways of doing things, is overwhelming the planet's ability to sustain a life support system.

It is a physical law of nature that infinite growth cannot be sustained in a finite space. And yet, the human species' direction and pace is apparently seeking, though futilely, to disprove this law. The planet is a finite space. Through time, there has come to be an ever increasing number of human beings living off of the planet's resources; and along with the increasing numbers, there has also been an ever increasing per capita demand placed on this resource base. This per capita increase has in great part been due to humankind's rapidly accelerating technology—knowledge and tools—which has helped the species to more extensively and intensively use resources for more things.

So from two basic standpoints—pure increase in numbers (quantity) and per capita increase in consumption (quality)—the human species is closing in on its finite support system. If this growth pressure is not ultimately slowed and controlled purposefully by humankind, the life-giving resource base will be overwhelmed by depletion and pollution: this climax will in turn automatically halt the overpowering growth that the species failed to curtail.

At some point along this growth line, there must be some generally optimum condition where a relatively static population/per capita impact combination can be perpetuated on a sustained yield basis. It is well known, and has been intensively studied in many other life forms, that a given habitat can support a certain population of a given species at a particular quality level on a continuous basis. Is the human species any different? We have commonly referred to this optimum population as the *carrying capacity* for that population for that habitat. It must be stressed, as it is essential in the concept of carrying capacity, that all of this interplay is based on sustained yield—that is, the resource must be able to support the population load indefinitely without continuing degeneration of the resource.

From the beginning of time, there have been several major forces prevailing that interact to produce a certain *quality of life*. As the forces change, so may change the quality of life. Historically, humankind has generally accepted the quality of life that has forth from the interplay of these forces. More recently, however, humankind has become somewhat dissatisfied with some aspects of the quality of life product, and is now for the first time beginning to seriously look at the ingredients from which this product springs, and to question the propriety of the balance of these ingredients. Examples are the growing questioning of the forces of population, technology and culture.

To visualize the relationships among these forces and their product, it may be helpful to envision a somewhat oversimplified formula that graphically portrays the factors or forces involved. Such a formula might look like this:

$$\text{Quality of Life} = \frac{\text{Natural Resources}}{\text{Population}} \times \text{Technology} \times \text{Culture}$$

where Quality of Life (QL) represents the character of the total environment influencing a human being or a group of human beings (humankind); National Resources (NR) represents the planet and its organic and inorganic components (the global life support system); Population (P) represents the number of human beings; Technology (T) represents the tools and knowledge of humankind; and Culture (c) represents the attitudes, perceptions and values of humankind.

The purpose of this formula is to show that the quality of life is a function of the relationship of several key forces. Now, to follow through the development of the formula:

$$QL = NR/P$$

shows that, with a finite resource base, as the population living off of it increases, there is less natural resource base per person, and the quality of life product consequently decreases.

Enter Technology (T):

$$QL = NR/P \times T$$

T can be a positive or negative modifying factor in its influence. For instance: we have a finite amount of iron ore on this planet. We cannot create more. With increasing population-use pressure on this finite resource, the quantity begins to decrease. When there is less to go around, the quality of life, too, may decrease somewhat. If we have the technology to recycle our used up, cast-off iron, we can ease the depletion squeeze somewhat. In this case, technology (T) eases the pinch and buys some time in the face of increasing demand, but is not a total solution to the ultimate depletion problem. The modifying factor of T is positive here in its influence (for you mathematicians, the numerical value of T would be greater than 1.0).

There are, however, many examples where technology wrongly applied can be a negative factor (in which case the numerical value of T would be less than 1.0). There are other examples where the impact of technology can be a combination—a positive factor in one sense (application of pesticides to decrease insect damage and increase crop yield), while a negative factor in another sense (this same pesticide creating residues that accumulate in distant water bodies, adversely affecting life and depleting fish production crop yield).

Enter Culture:

$$QL = NR/P \times T \times C$$

We can have all the technology in the world, but if we don't have the will or see the necessity to use it properly or at all, it may as well not exist. For example: there is a growing amount of talk today about our need to change our individual and societal attitudes, values and actions in the face of developing adverse environmental conditions. Perception, concern and commitment to action currently varies from high to nonexistent in our society. Divergent attitudes toward issues of recycling, resource conservation, population control and ownership of things (affluence) are examples.

Again, the interplay of these forces represented in the formula brings forth the final product—quality of life.

Our human world is only beginning to scrutinize the advisability of reversing the flow of the formula. We are beginning to perceive a continuing decline in overall quality of life, and we are concerned about it. We are beginning to look toward the need for mastery and purposeful influence and control over the forces that are affecting the quality of life so that we can bring forth and sustain an acceptable quality of life product. Hence, the mounting recognition and concern over such issues (forces) as population, technological application, resource depletion and human attitudes and values.

Our greatest challenge of the immediate future in our society is to collectively decide upon the optimum quality of life standard

(or array of different standards) acceptable and realistically achievable for our world society, and then to purposefully influence those forces producing this standard in such a way as to achieve and perpetuate those desired standards on a sustained yield basis.

So, you ask, what then has all of this to do with national parks? The principal philosophy and law guiding the American national parks is that the resource base will be preserved on a sustained yield basis, but along with a certain amount of use of it by visitors. This general concept underlies the establishment of many of the national parks and equivalent reserves throughout the world. In essence, the relationship of the forces identified above is the same for any land entity, be it planet, nation, state, county, city, national park system or national park; it is only a matter of scale.

The same basic forces are at play in the US national park system as discussed above for the planet. Only the terminology need be modified a little:

$$\text{Quality of Park Experience} = \frac{\text{Park Resources}}{\text{Visitors}} \times \text{Technology} \times \text{Culture}$$

The representation of Quality of Park Experience (QPE), Park Resources (PR) and Visitors (V) should be obvious when compared with the earlier formula, while Technology (T) and Culture (C) remain the same. Many influences (forces) on the quality of park experience can be imagined in regard to varying approaches in impact caused by controls over visitor numbers, technology (mode of access, visitor-use technologies permitted, etc.) and culture (expectations, attitude, behavioral practices).

Again, in essence, where we talk about identifying an optimum quality of park experience to be perpetuated on a sustained yield basis, we are talking about carrying capacity. We must identify the quality of park experience we feel is desirable and realistic on a sustained yield basis, and then regulate the influencing forces accordingly so as to assure the achievement of that desired quality objective.

We have long talked with regard to the US national parks about the great need for operating the parks on a carrying capacity basis; moreover, law now requires that this be the case. But except for a few ioslated instances, we have failed to consciously and purposefully do so. Systemwide, we have not instituted the carrying capacity concept as a basis for management. With a few exceptions, we still basically submit to the adverse impact on the quality of park experience wrought by ever increasing visitor pressures, and, to a lesser extent, we still also succumb to the advancing onslaught and adverse impact of certain technologies.

We desperately need to identify the array of quality of park experiences we expect a given park—and, collectively, the entire park system—to offer, and then purposefully influence the forces at play in such fashion as to achieve and maintain that desired quality objective. We are definitely talking about the carrying capacity here of the park resource for people.

By definition, carrying capacity must entail two principal components: physical capacity and social capacity. The former concerns that which the resources can physically withstand and still sustain itself without substantial degradation over time.

The latter involves the upper limit of those subjective considerations that users find acceptable in terms of human influence, such as congestion, degree of solitude, etc. It is quite possible that the social capacity limit will be reached in many instances before the physical capacity is reached.

There is no legitimate reason why total carrying capacity as applied to the parks cannot be identified fairly rapidly anywhere. We have in a sense partially done this job already in the internal land classification zoning of parks as to segregation of appropriate types of uses and experiences to be gained--wilderness, developed areas, etc. (basically dealing with the T factor of the formula). We have now only to refine and strengthen that somewhat, and then to assert appropriate control over the population factor (V) of the formula, along with the influences over the culture factor (C) to complete the job.

All of this has been a long way around to building a base for getting at the key point, but such a base is essential to help assure proper understanding of the argument, which is this:

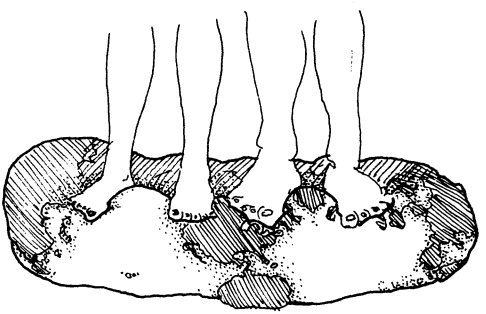
> *Wherein lies the similarity of the problems of the parks and the world, therein also lies the similarity of the solutions to these problems of the parks and the world.*

For both entities, if we value the quality of life and quality of park experience, we must recognize the need to implement the carrying capacity concept as the basis for the management of both.

The parks represent a microcosm of the larger world, and as a smaller, more manageable part of the whole, have an unparalleled opportunity to become a model system exemplifying the carrying capacity concept of management for the enlightenment of the larger world. This does not mean that the world should be managed like the parks or that the desired product outside the parks should be similar to that within—that is not the point. But it does mean that, whereas parks must influence the population, technology and cultural forces within to achieve and maintain the desired quality of park experience, the world must likewise influence the population, technology and cultural forces to achieve and maintain the desired quality of life product.

The National Park Service possesses both the legal and the philosophical base and mandate upon which to move forward in developing and implementing carrying capacity as its backbone for park management. To the extent that it moves purposefully forward here, the result could bring greatly heightened benefits to both resources protection and public enjoyment within the parks. To the extent that the National Park Service takes the further step of exposing and modeling its actions through public awareness and educational efforts, it could model the concept of carrying capacity as a much needed management approach to be considered and adopted by the rest of the world outside of the parks.

In this respect, parks could become all the more relevant to the welfare of our society and our civilization.



This article was adapted and condensed by the ZPG Reporter of November 1981 from a speech written a decade ago for use at the Centennial celebration for Yellowstone National Park. Peters' arguments must be included in the still unfinished matter of what park and reserve carrying capacity is all about. Other arguments and views concerning this important issue are, of course, welcome.