LOW DENSITY RECREATIONAL SERVICES: AN APPLICATION OF THE THEORY OF CLUBS

Author: ERNESTO REZK
Assisted by: Andrea V. Resk and Maria Cecilia Gáname
Institute of Economics and Finance
National University of Cordoba
ernerezk@eco.uncor.edu

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ABSTRACT

Increasing demand for recreational services of the kind provided by wilderness areas is a worldwide phenomenon. However, a distinction has to be made when analyzing optimal recreation capacity of low-density facilities as wildlands, by being generally a unique resource, can not be replicated and supply is therefore fixed at its present level.

The above mentioned feature makes also necessary to consider the problem of congestion and the measurement and impact of crowding costs upon optimal recreation capacity.

Following Buchanan's Theory of Clubs and acknowledging the effect of crowding on willingness to pay, the paper outlines a general model of wilderness management in which, optimal recreation capacity for low-density wildlands is dealt with.

Further, the results are analyzed with reference to efficient management both when markets perform the allocative function or when the need arises for public intervention.

KEY-WORDS: clubs, crowding, willingness to pay, wilderness management, recreational services, profit maximization, public policies.

ABSTRACT

El incremento en la demanda de servicios de recreación del tipo de los provistos por las áreas naturales es un fenómeno mundial. Sin embargo se debe distinguir, al analizar el tema, el caso de capacidad óptima de recreación de las áreas de baja densidad (caso de reservas o parques naturales) que constituyen un recurso irreproducible y por tanto su oferta está fija al nivel actual.

El rasgo mencionado requiere también considerar el problema de la congestión y él de la medición e impacto de los costos de congestión sobre la capacidad de recreación óptima.

Siguiendo la Teoría de los Clubs de Buchanan y aceptando el efecto de la congestión sobre la disposición de pagar del usuario de los servicios, el artículo ensaya un modelo general de manejo de las áreas naturales en el que se considera la capacidad de recreación óptima de las zonas de baja densidad.

Más adelante, se analizan los resultados con referencia a un gerenciamiento eficiente ya sea que los mercados ejerzan su función asignativa o que se de la necesidad de intervención pública.

PALABRAS CLAVES: clubes, congestión, disposición de pagar, manejo de las áreas naturales, servicios de recreación, maximización de beneficios, políticas públicas.

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I. INTRODUCTION

Outdoor recreational activities have grown steadily in the past decades, mainly due to greater incomes per capita, population growth and better transport facilities, but also owing to increased urbanization which somehow explains the need to return to nature and to enjoy ‘ecological’ leisure and some degree of solitude.

An important distinction needs to be drawn, when analyzing outdoor recreation, between relatively ‘homogeneous’ resources such as playgrounds, campings, city parks or even the more sophisticated ski fields, which admit a certain supply flexibility (in response to demand pressure) and the so called ‘unique’ resources, whose stock can not be replicated and their supply is fixed at a determined present level.

It is precisely in the latter category of unique natural phenomena (that is, national or provincial parks, natural reserve areas or simply wilderness areas) that recreational services show a sustained and growing demand and in respect of which there exists a mounting concern demanding managements of recreational uses oriented to ensuring their conservation.

Managerial methods have also been studied in relation to the form of better providing outdoor recreation, by allowing the market to perform allocation through the price system, unless the excesive burden of externalities demanded public intervention. In this regard, and given the acknowledged impact of CROWDING in the recreational use of the resource, it must be noticed that despite the fact that congestion costs sum to other costs for deriving equilibrium prices and quantities, the former are more clearly a constraint when unique resources are dealt with in reason of the impossibility of augmenting the existing stock.

The above assertion holds particularly true if one realizes that CONGESTION is directly related to quality deterioration of the service, for what greater use levels are not always tantamount to achieving greater benefit flows out of recreational activities. In the light of this, the paper seeks to analyze optimal recreation capacity for low-density recreational use facilities, which will require to estimate willingness to pay functions; in doing so, the total economy point of view of clubs will be resorted to[1] which departs from the already classical Buchanan's Theory of Clubs (1965) in that members and non members are considered and that the utilization rate varies between members.

The derived managerial model sketched in the paper will later be applied to wilderness areas located at the heart of the extense hilly region in the province of Cordoba; in particular, the granite-like region called 'Quebrada del Condorito', whose 40,000 has. of mountains, rivers, water falls and valleys house unique and rare trees and are also the haven for a varigated fauna, including pumas, eagles and condors.

Due to the risk that unconstrained trekking and hiking activities by weekenders, tourists or occasional visitors could derive in strong externalities, in terms of resource degradation, the province sought to and succeeded in obtaining for Quebrada del Condorito the legal status of a national park. At the same time, by being a low density area, externalities and services' loss of quality resulting from congestion places this variant of outdoor recreation at the Quebrada del Condorito in the classical situation of impure public goods, whose optima provision levels and tolls have been matter of analysis in many papers since Buchanan's seminal article (1965) on the Theory of Clubs.

II. OPTIMAL CAPACITY OF RECREATION ACTIVITIES

By relating CONGESTION to the real resource recreational capacity A. Fisher and J. Krutilla (1972) differentiated 'carrying capacity', which basically referred to the physical relationship

[1] For those not familiar with the approach, T. Sandler and J. T. Tschirhart (1980) developed a simplified version del the general model of club from the total economy point of view.

between a given resource stock and its sustainability[2], from the 'economic' concept of capacity which extended to the point until which the resource kept yielding a constant quality product.

Following Fisher and Krutilla, it must be noticed that the limit of 'economic capacity' can be reached much before the ecological concept of 'carrying capacity' starts imposing a constraint on the provision of outdoor recreation. Needless to say, a situation of quality deterioration will be visible in that case as a result of externalities produced by crowding. In what follows, it will be assumed a resource stock whose ecological integrity is not being endangered so only congestion costs will enter into the analysis, to later suggest how the situation will evolve once ecological constraints are set.

In introducing the consideration of congestion, and for purposes of the diagrammatic exposition, let it be assumed that encounters in wildlands will be inversely related to utility in the sense that, beyond a certain point, satisfaction derived from outings in low-density areas will diminish owing to the presence of other recreationists[3] and that there exists a uniform distribution of the latter over the period of outings.

Figure 1 below, whose horizontal axis indicates services' provision level as a function of user days (membership size) while total benefits are measured along the vertical axis, shows a total benefit function when the underlying assumption is that any additional user affects the quality of recreation enjoyed by the already existing participants[4].

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[2] More specifically, A. Fisher and J. Krutilla (1972, p. 420) defined sustainability as the maximum number of individuals and species which can be supported by a given habitat under conditions of maximum stress.

[3] This form of approaching the congestion issued was used by A. Fisher and J. Krutilla (1972), F.J.Anderson and N.C. Bonsor (1974), C. Cichetti and V. Kerry Smith (1973), T. Deyak and V. Kerry Smith (1978) and many others.

[4] Another form of introducing this assumption would be to state that the quality of recreation services can be considered constant withing use intensity ranges whose thresholds are very small.

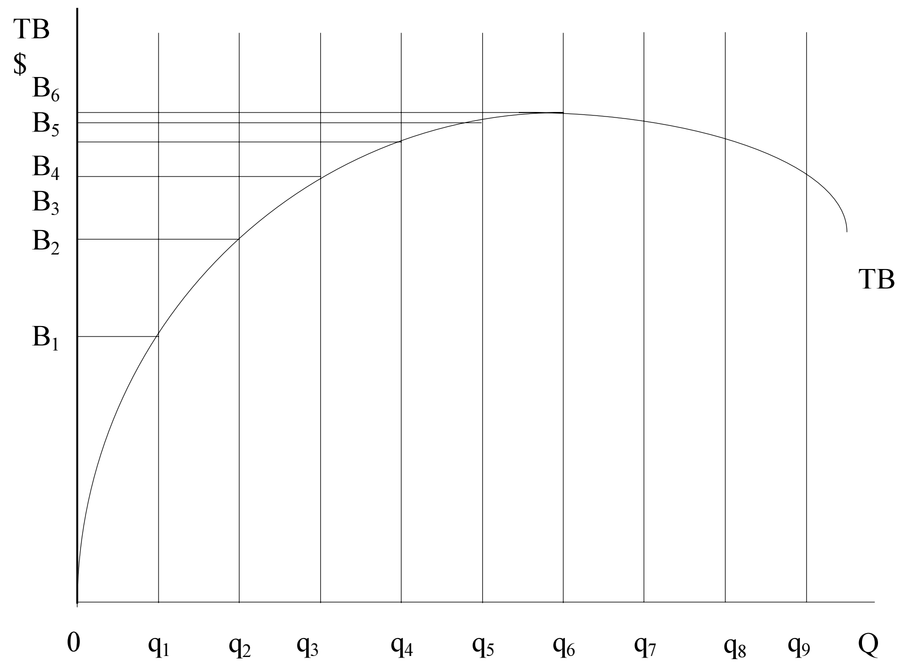

Figure 1

The above total benefit schedule relates to those presented by T. Sandler and J. T. Tschirhart in quadrant II (1980, p. 1494) in that all represent net benefit curves for whose estimation congestion costs were computed as the only incurred costs.

Figure 2 in turn depicts average and marginal benefit curves, whose points resulted, in the former case, from dividing any vertical distance from the total benefit curve to the horizontal axis (in figure 1) by the corresponding provision level, whereas in the second case points represent the incremental gains in benefits related to increments in resource's use intensity.

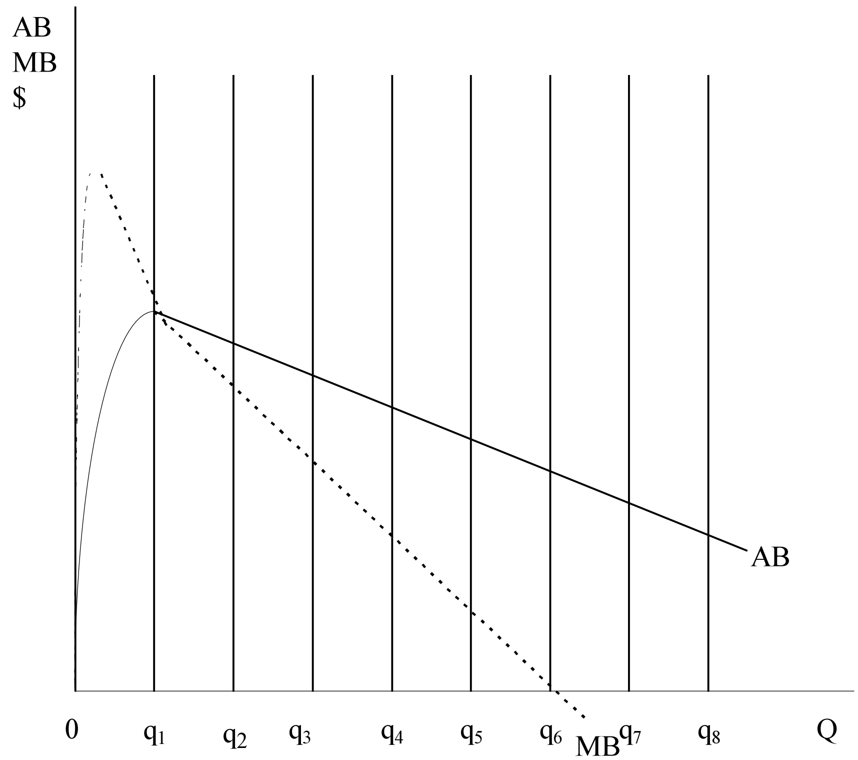

Figure 2

The following classical textbook solutions can be shown in figures 1 and 2: average benefits reach a maximum at the provision level in which the curve is intersected by the marginal benefit schedule; and the intensity use yielding the maximun net benefit coincides with the one at which marginal benefits are 0; this provision level corresponds therefore to the resource's optimal capacity[5], as the concept of capacity was defined above on economic grounds.

By considering so far that net total benefits resulted from computing congestion costs imposed upon recreationists as intensity of use increased, the rationale was that beyond a determined provision level (membership) crowding can be definitely undesirable in so far as satisfaction out of recreational activities declined (direct effects of congestion[6]) in direct relationship with the service's quality deterioration.

[5] Another form of viewing this optimum is (A.Fisher and J.V. Krutilla, 1972, p. 425) as "the point at which the cost of incremental congestion disutilities just equals the benefit of incremental gains to utility".
[6] The use and meaning of this expression is found in F.J.Anderson and N.C.Bonsor, 1974, p. 53).

Conversely to the previous case, indirect effects of congestion appear when increased intensity of use causes (or it is in a position of potentially causing) serious or irreversible damages, in the form of ecological alterations, to the resource itself. Should this be the case, a separate[7] marginal cost of 'ecological damage' curve would have to be added in figure 2 above and whose impact on the optimal capacity would depend on where the schedule finally rested: if the curve of costs of ecological damage intersected marginal benefits at any point above the horizontal axis (positive values for MB), the optimal intensity of use level would fall short of optimal capacity, as achieved when potential damage to the resource was not considered.

If, on the contrary, the curve depicting ecological damage is not seen to intersect the marginal benefit function, the previously determined (on economic grounds) optimal intensity use level holds and it will mean that physical damage to the resource is not important enough to cause 'carrying capacity' to be an effective constraint.

For simplicity, the analysis has so far assumed, and will continue to assume, that no administrative costs were incurred. It is however simple to realize that when management costs exist, they would impose (by rationing use) a limit to service provision should their curve intersect the marginal costs curve above the horizontal axis.

But administrative or management costs could somehow be shifting up the marginal benefit curve MB in figure 2, implying in that case that all recreationists would have (as a consequence of resource management costs) a higher outing utility; the likely result would in this case be that intensity use or level of service provision would be greater, compared to the case without management costs.

Finally, and also for simplifying reasons, no investment will be allowed for in this stage of the analysis although it must be noticed that the effect of capital spending (by reducing congestion

[7] In so far as costs of ecological degradation could be extensive, irreversible o permanent and could affect utility of individuals beyond wildland users, Fisher and Krutilla (1972, pp. 425-6) favour to show them separately and not to incorporate them in the net marginal benefit function as congestion costs were.

disutilities) will not be other than increasing capacity '...without a proportional increase in encounters'[8].

III. DIAGRAMMATIC ANALYSIS OF DEMAND FOR LOW-DENSITY RECREATIONAL SERVICES

It can be stated, according to the received theory, that the price for low density recreational services is a function of the number of visits (intensity use) and also in this case of the degree of congestion faced by recreationists assuming, as is generally pointed out in the literature, that intrusions to recreationists' solitude will dwindle the quality of services.

Demand curve[9][10] DaDa represented in Figure 3 below, denotes prices (willingness to pay) for alternative number of visits in the assumption that the degree of congestion is kept constant all throughout the demand schedule. When crowding (number of visits) is allowed to vary the demand curve displaces downwards (DbDb, DcDc, DdDd) indicating that individuals' willingness to pay reduces as a result of costs of congestion imposed upon them at each demanded quantity[11]. Ch. Cicchetti and V. Kerry Smith (1973, p. 17) referred to this downward displacement as the value of the increase in the intrusions to solitude of recreationists, measured by the number of encounters.

It should be noticed that, for any demand schedule in Figure 3, the area under the curves will depict the well known consumer-producer surplus concepts whose joint maximization will take place at a quantity level (number of visits) q* and price p* (willingness to pay) if DcDc is the chosen demand schedule.

As mentioned above, the area abcDc is the consumer-producer surplus in the case that DcDc is the relevant demand curve

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[8] A. C. Fisher and J.V.Krutilla (1972, p.429). This paper includes an excellent diagrammatic exposition of the inclusion of capital spending in the analysis of low density recreational areas.

[9] It should be noticed that demand curves in figure 3 can be linked to the marginal benefits schedule in figure 2 in so far as they are similar for any intensity use if crowding is kept constant.

[10] As indicated by F.J.Anderson and N.C.Bonsor (1974, p. 55), observed demand curve DD in Figure 3 is the relevant curve when crowding effects do not exist, in which case optimum price is p*** and the joint consumer-production supply will equal to agD. When congestion effects exist DD will lose it allocational significance and the consumer-producer surplus is measured by the area under the other demand curves previously defined in figure 3.

[11] It must be noticed that although congestion increases as curves move downward, the degree of crowding is still kept constant all throughtout the new demand schedule.

and MC the marginal cost curve; q*b measures in turn marginal user costs at intensity use q* whereas the vertical distance bc stands for the marginal crowding cost for the same quantity level.

It is clear that a downward displacement of demand curves, i.e. from DcDc to DdDd in figure 3, will entail more crowding and newly derived price/quantity sets.

What will it happen to joint consumer-producer surplus when a downward movement of the demand curve takes place?. The answer to this question requires considering the net result of the two following contrary effects: As more recreationists are allowed into wildlands (higher intensity use in terms of the number of visits) the shaded area to the right of q* will be representing their additioned utility; but more recreationists will in turn mean (due to crowding) services' quality deterioration as regards the standing standard in intensity use q* for what the shaded area above and to the left of q* will be precisely representing that quality loss and will in turn bring about a decrease in the willingness to pay moving price from p* to p**.

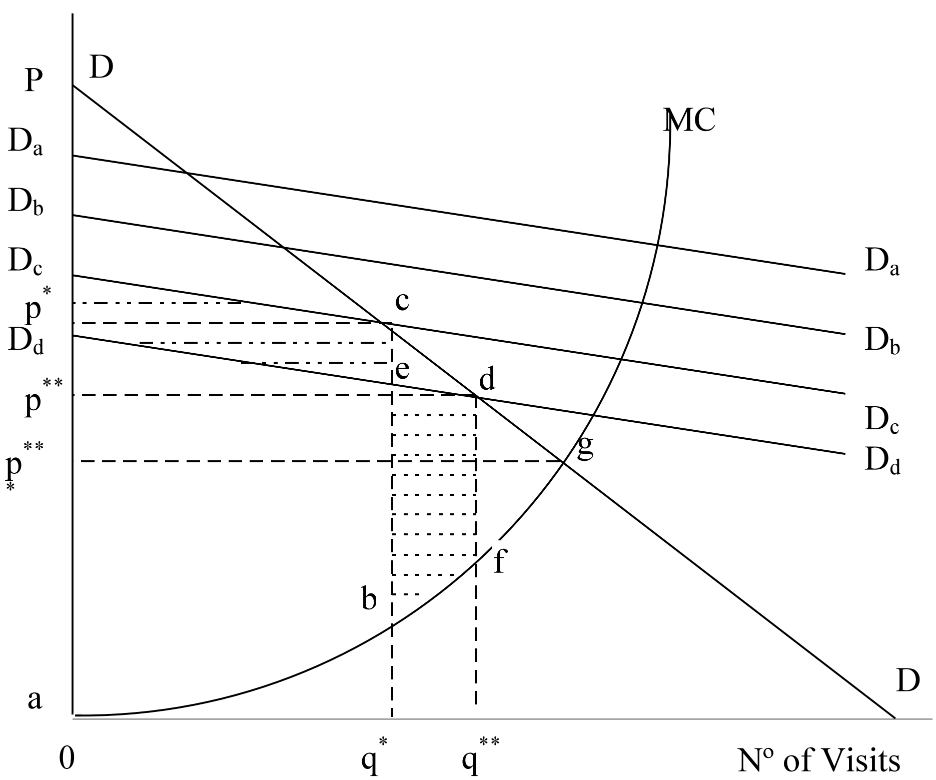

Figure 3

As the new consumer-producer surplus will now be the area afdDd, as long as the utility of entrant visitors outweighs the loss of utility due to congestion experienced by recreationists at the previous intensity use the joint surplus will increase and viceversa. In this case the increase in the number of visits clearly reduced the joint consumer-producer surplus.

IV ESTIMATION OF WILLINGNESS TO PAY

According to traditional Utility Theory, and regarding outdoor recreation as a normal good, one assumes that the more recreationists consume the more utility they will derive; but, at the same time and due to possibility of congestion, utility will also depend on the number of recreationists with whom the unique resource is to be shared. Consequently, and as specified in equation 1 below, individuals' willingness to pay function for wilderness services will depend on their consumption as well as on the resource' total level of use:

(1) WTPi[12] = f(qi, Qi, Yi, Ti)

where:
WTPi = individuals i' willingness to pay
qi = amount of recreational services consumed by the ith individual
Qi = resource's total level of use, as perceived by i
Yi = individual i's socio-economic profile
Ti = exogenously determined individual i's tastes

with $\delta fi/\delta q > 0$, $\delta^2 fi/\delta q^2 < 0$

$\delta fi/\delta Qi < 0$, $\delta^2 fi/\delta Qi^2 > 0$

$\delta fi/\delta Yi > 0$, $\delta^2 fi/\delta Yi^2 < 0$

$\delta fi/\delta Ti > 0$, $\delta^2 fi/\delta Ti^2 < 0$

An operational form of determining Qi could be considering what recreationists in low density areas would be willing to pay for

[12] In taking individual i's willingness to pay for the service, the development is here in line with the normal assumption of the representative individual found in models of clubs.

enjoying outdoor activities, subject to a given level of crowding; in other words, one can introduce E (as a proxy to Qi) standing for the average (or rather the expected) number of daily pack encounters in the reserve under study[13].

In other words, and following A. Fisher and J. V. Krutilla (1972), the introduction of E will permit one to derive the WTP function for alternative provision levels (recreation days) and according to the generated expected number of daily encounters.

While tastes can in this case be considered a non observable variable, whose effect upon WTP will somehow be reflected in the error term, recreationists' socioeconomic characteristics can be introduced either by means of an income variable or, as is purported to be in the estimation, as a dummy variable with values 1 and 0 respectively for recreationists having or not at least tertiary studies.

Equation 2 below indicates as follows the specification of the Willingness To Pay function:

(2) $WTP^{14} = a_o + a_1 q + a_2 E + a_3 Y + \varepsilon$

Data required for the estimation of the WTP function are not the type of information usually available through the market for what diverse techniques have to be resorted to in order to collect data. In so far as recreationists are directly interviewed (be it through colective questioning schemes, answers placed to determined groups or whatever mechanism may be at interviewers' disposal) one is confronted with the problem of achieving sound preference revelations.

The main problem faced when preference revelation is aimed at resides in the likely degree of unreliability in responses given by individuals. This is particularly severe when individuals regard the service as a public good and they overestimate or underestimate their responses under the assumption that they will not anyhow be

[13] The expected number of pack encounters could also be a vector if, as in literature is usually found, E stands for different type of encounters (i.e., hiker parties, horse parties, camp encounters and so on).
[14] There are cases in the literature of logarithmic and semi-logarithmic formulations of the WTP function. We will adhere to a lineal formulation in our presentation, although alternative specifications will later be suggested should estimations yield relative better results.

excluded from consumption. Other authors point out the lack of correspondence of people’s behaviour (as regards WTP) when they are asked to respond to hypotethical cases, as regards their attitude vis-a-vis real situations.

In order to limit the risk of biased answers, the set of questions put to individuals will be framed in techniques such as those used by E.A. Thompson (1966), whereby individuals can freely reveal their preferences as an insurance mechanism is used to compensate losers. Other approaches will also be tested, in special the indirect inference of consumer-surplus through proxy variables.

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