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THE ECONOMIC VALUE OF GAME-VIEWING AS A FORM OF LAND USE

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THE ECONOMIC VALUE OF GAME-VIEWING AS A FORM OF LAND USE

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This paper arises out of a study in progress at this Institute to assess the value of game-viewing as a form of land use in East Africa. It begins with a discussion of what is meant by the term "value" in the context of the land use decision. While the main emphasis of the paper is on the objects, methods, and problems involved in the economic analysis of land use alternatives, it finishes with a few remarks based on the data for game-viewing which have been collected so far.

Discovering the value of game-viewing as a form of land use is a worthwhile exercise if there are incompatible alternative uses for the land which have a positive yield.¹ Given present technology and the cost of capital, large areas of Tsavo, for example, are at best marginal ranching land and wildlife has no close competitor. There are more areas where land used, or potentially usable, for game-viewing could be put to other uses. The Athi Plains are the most obvious case but the same might be said of all the Masailand game areas in Kenya and Tanzania as well as the major National Parks in Uganda. Of greater interest, because their futures are uncertain, are those areas which are as yet undeveloped and where there are feasible alternatives to wildlife. The Shimba Hills and Lambwa Valley in Kenya are two such areas which have received considerable publicity in recent months, but there are several others as well.

¹Sometimes, there are opportunities for multiple use. There are fewer such opportunities in areas used directly for game-viewing than in areas where other wildlife activities are conducted. Persons who come to see the animals in 'unspoilt' Africa do not want the illusion dispelled by the presence of cattle, mobile abattoirs, forest plantations, etc. There are more opportunities for multiple use in areas not used directly for game-viewing, but which provide the hinterland for the support of stocks of game viewed by tourists. While multiple use in areas like this may have a significant influence on the economic viability of game-viewing, this issue is not discussed in this paper.

If the land allocation decision is to be rational, two requirements must be met:

1. There must be some criterion (or criteria) for choosing among the incompatible alternatives; and
2. the yield of each of the alternatives must be measured in terms of the criterion (criteria).

It must be emphasized that the value of only one objective can be maximized at once. If there are several incommensurable objectives which policy makers wish land allocation decisions to serve, then the job of the analyst is to evaluate each of the alternatives in terms of each of the objectives. The analyst cannot say which use is "best". He can only point out the payoff of each use in terms of the various criteria, and illuminate the sacrifice in terms of some criteria, and gains in terms of others, which will accrue from choosing this use versus that.

This paper employs one possible criterion: the maximization of East African National Product (NP). According to this criterion, that use of the land will be best which maximizes the incomes of persons living in East Africa. A review of some of the rejected alternatives will illustrate the meaning of this criterion, and provide the justification for choosing it over the others.

A product, or income, criterion is chosen over a welfare one in part because of the problems of measurement, but basically because the consumer surplus generated by East African game-viewing accrues to foreigners whose welfare is not of especial concern to the East African governments.¹ For the same reason, the incomes of East Africans rather than world income has been chosen.

Given that an income measure is appropriate, the question becomes: whose income is to be maximized? The maximization of East African NP rather than the NP of a smaller unit has been chosen since this will result in at least as large an income to East Africa as if each sub-unit maximizes

¹See P. H. Pearse's paper at this Symposium "An Economic Approach to the Problem of Range Competition Between Cattle and Game", for further discussion of this issue.

its own income independently of the others. No Country or District or even Location within East Africa need be worse off under the maximization of East African income than under maximization of income of residents of a smaller unit. Ensuring that this is true in practice will probably require compensation of individuals or countries. Depending on the policies of the situation, compensation may be direct in the form of money payments, or indirect in the form of larger grants for education, social services, capital for improving ranching practices or concessions regarding the location of industry.

National Product is a measure of the incomes of residents in the region. It consists of the value of output less payments to non-resident owners of factors of production plus payments to residents for their factors employed abroad. Policy makers are undoubtedly more concerned with the incomes of citizens than of residents. However, the data do not exist to permit an accurate disentanglement of incomes accruing to resident foreigners versus citizens.

Using an income measure of yield also means that the analysis will ignore the 'conservationist' and scientific value of maintaining wildlife areas. This does not mean that these values are unimportant. Indeed, statements on the preservation of the wildlife heritage of East Africa by leaders of these countries have made it clear that these aspects are of very great importance. The reason for ignoring them here is that the conservationist and scientific values, where they are not intangible, are extremely difficult to measure.

The maximization of NP implies that the appropriate measure of the value of an activity as a form of land use is the net contribution to NP from devoting a piece of land to that activity over the best alternative activity. The alternative would be gross contribution to NP, i.e. turnover generated less payments made to non-residents.¹ The gross measure ignores the fact that some productive factors used in the activity would, in its absence, produce output and earn incomes in other

¹This is the criterion suggested by Crutchfield at this Symposium. Gardner Brown and James A. Crutchfield, "A Money Flows Approach to Investment in Game Management."

economic activities. To the extent they would, this activity would not make a net contribution to NP. This idea can be clarified by a numerical example. The game-viewing activity requires a considerable amount of labor. Say that the least skilled class of laborer earns Shs.150 per month. Is this a cost of game-viewing? or a gain? Certainly, the Shs.150 will be a cost to the employer. The question is whether the social cost is the same as the private cost of Shs.150. If the best alternative of the worker is unemployment -- and the large number of unskilled unemployed in East Africa suggests that this may be the case -- then from the social point of view the cost of employing this worker is Shs.0 since employing him in the game-viewing enterprise occasions no loss of output elsewhere in the economy. On the other hand, if he could produce an output on the land of Shs.70 per month, the social cost of employing him in the tourist sector would be Shs.70 and the net increment to NP from tourism due to his employment would be Shs.80.

A few comments can be made about the opportunity costs of some major items. All excise duties, customs duties, licence fees and park entrance fees, while they are private costs, are not social ones since they do not represent a withdrawal of resources from other sectors of the economy into game-viewing.¹ Arguments might be made to show that foreign exchange is over or undervalued at the current exchange rate (depending upon what are considered valid supplies of and demands for foreign exchange). It is assumed here that the price of foreign exchange accurately reflects its opportunity cost. Capital is taken up below in the section on discounting. It is assumed that the wages of managerial personnel represent their social cost since there does not seem to be any surplus of this category of labour in East Africa.² In cases where there is some doubt

¹This statement should be qualified. Insofar as the collection of taxes, licence fees, etc. requires the use of scarce resources, tax revenues have an opportunity cost. The on-site cost of collecting park entrance fees is considered as a cost in this paper. However, it is assumed that the tourist industry does not occasion the employment of more collectors of customs or excise duties than would be employed in its absence.

²We might note that non-citizen employees in this industry are in managerial positions. The assumption that their wages accurately reflect their opportunity costs results in those wages being deducted from turnover in the calculation of net yield. This means that for this class of input, there is no difference between the national product measure of net yield and the measure which considers the contribution of game-viewing to incomes of citizens alone.

about opportunity cost -- and the above example of unskilled labor suggests that there is much room for legitimate difference of opinion about the proper assumptions to be used -- it is worthwhile testing the sensitivity of the value of game-viewing as a form of land use to different plausible assumptions about opportunity costs.

The opportunity cost of land used for game-viewing is the amount which the land would contribute to NP if devoted to the best alternative to game-viewing. In the absence of any detailed analysis of the alternatives, it will be convenient to calculate yields gross of opportunity cost of land (i.e. gross of rent). The same figure can then be calculated for other uses, and comparisons made to see which use yields most. This calculation for one use only at least indicates the yields which other uses must reach to beat it, and the existence of such a figure for game-viewing may encourage its calculation for others.

Having discussed the measurement of costs, we must consider revenues. Tourism by visitors currently brings about £14.5 millions into Kenya alone. If we assume that the foreign exchange cost of goods and services used by tourists is 25% of what they pay, the gross contribution to NP of tourism, which is still largely based on the wildlife resource, is £10.9 million. All available statistics point to the fact that tourism is growing. To take some statistics almost at random, we find that from 1965 to 1966, the number of nights spent in Kenya game lodges by visitors rose by 63%. The lowest compound annual rate at which visitor nights at game lodges rose on a same month to same month basis for the two years 1964 to 1966 was 38% (December) -- and for some months the rate was over 150%. Or again, the year to year rates of increase of holiday visitors to Kenya were 39.5% from 1962 to 1963, 10% from 1963 to 1964, 45% from 1964 to 1965 and 52% from 1965 to 1966. However, such overall figures as these are of little assistance when we are concerned with evaluating the contribution which particular areas of land devoted to game-viewing will make to NP.

Unfortunately, the revenues earned on-site may not represent the appropriate figure for two reasons. First, for the vast majority of foreign tourists¹ a visit to game area A is a joint input into a tour which includes visits to several other attractions, including non-game areas. The development of area A will, if it increases the number of visitors taking tours including A, increase the demand for these other attractions. In calculating the revenues generated by A, we should therefore add to the revenues earned on site the increase in revenues to facilities taken in conjunction with A, net of their opportunity costs. Second, since there is more than one tour which tourists may take, the development of A may result in some tourists switching from other tours to those including A. The reduction in the net contribution to NP due to the reduction in demand for substitute facilities should be deducted from A's revenue figure. Unfortunately, a regression analysis to determine the strength of the interrelationships in the demand for facilities in East Africa would require much more data about the goods taken by different types of tourists, their incomes, etc., than is available for any one year, let alone the number of years which would be necessary to give sufficient degrees of freedom to achieve significant coefficients for even the minimum reasonable number of explanatory variables. It is therefore necessary either to use some proxy measure for the figures we want, or to approach the problem from a different point of view.²

¹ The treatment of resident game-viewers' expenditures should perhaps be different from that of visitors' since residents may face many more alternative opportunities for recreation within the region. To the extent that they are expatriates who, in the absence of game-viewing opportunities, would take more money with them when they leave East Africa, they should be treated like visitors. This issue is ignored in the rest of this paper.

² One approach is to identify the bundles of goods (including area visited, type of facility used, curios purchased, etc.) taken by different types of tourists and then to project the numbers of each type of tourist into the future. Doing projections of this kind assumes that the German package tourist of 1970, say, will demand the same bundle of goods as his 1967 predecessor. These projections will permit the estimation of revenues for the complex of goods purchased by each type of tourist, but will provide no basis for allocating the net contribution to NP of a given type of tourist among the goods purchased by him. Insofar as different types of tourists purchase different bundles of goods, it will be possible to compare in a gross way the profitability of different attractions and facilities.

We can distinguish two extreme assumptions which permit conceptually simple estimates. First, if, from the tourists' points of view, there is a perfect substitute B for a game-viewing area A, the net contribution of A is the difference in opportunity costs of developing and running B versus A for game-viewing. Second, if the game-viewing area is neither a substitute for, nor a complement with, any other East African attraction, the expenditures incurred by visitors travelling to and from that area, and their expenditures on site, will be the appropriate revenue figure to employ in calculating the yield of game-viewing.

If we are not satisfied with the estimates provided by these extreme assumptions and if we are unable, for lack of data, to provide statistical estimates of the strength and nature of the interrelationships among different game-viewing areas, we must resort to some ad hoc assumptions. One such is to assume that we can identify the major attractions which bring each type of tourist to East Africa. We can then make a calculation of the overall profitability of each type of tourist and allocate that total among the attractions visited. Another procedure would be to measure the on-site expenditures at each attraction, and then add to this figure the social profitability of goods purchased outside the specified attractions divided by the number of attractions. This assumption implicitly assumes that there are neither strong substitute nor strong complementary relationships among attractions and that non-attraction purchases are equally complementary with all attractions. If we assume that the number of days spent at each attraction reflects the importance of the different attractions in bringing visitors to East Africa, we should allocate the off-site profitability on the basis of the number of days spent at each attraction. The regrettably short empirical section of this paper concentrates mainly on on-site expenditures.

Since different activities can be expected to grow or contract over time at different rates, and since later changes in patterns of land use may be expensive -- infinite in cases where unique ecosystems are destroyed and some species are rendered extinct -- it is important that the valuation system used in guiding land use decisions take the future costs and benefits of each activity into account. The method

for doing this requires projecting the future costs and benefits of the alternative uses, calculating the net contribution to NP for each future year, and then discounting this stream of net contributions to NP to the present. The largest present value will then indicate which use of the land will maximize NP over time.

It is difficult enough to evaluate costs and revenues for the contemporary period. Forecasting these magnitudes is even more problematical.¹ The available statistics are insufficient to permit sophisticated statistical projections of tourist demand to perform any better than naive projections qualified by casual information from tour operators, tourists, and relevant Government Ministries. On the cost side also, we can expect the future to be different from the present, but the easiest assumption to make is that opportunity costs will remain constant over time.

¹ When doing projections of demand and costs, it is important that these projections take into account the effects of foreseeable policy decisions regarding airfares, pricing of tourist services, taxation and infrastructural investments in roads, airstrips, etc. Ideally, such decisions should themselves be evaluated in a cost/benefit framework. If policy on these matters changes in future, projections based on the present situation will be incorrect. However, each of these issues requires study on its own.

One issue which does deserve mention here is the degree to which the three East African countries co-ordinate development of tourism. At the moment, it is quite clear that many visitors are attracted by East Africa, rather than by Kenya, Tanzania or Uganda alone, and that a large number visit more than one of the Countries while they are here. If one of the countries were to decide that it wanted to secure a larger share of East African tourism by expanding facilities competitive with those in the neighboring countries and perhaps by making it more difficult (expensive in time and money) to cross intra-East African borders, the effect would be to reduce East African NP compared with what it would be in a situation where policy decisions were taken so as to maximize East African NP. The reduction would occur due to the smaller number of tourists who would come to East Africa if it were more difficult to visit the collection of attractions which called their attention to East Africa in the first place, and to the cost of duplicating facilities for no net increment in tourist revenues. Even worse, from the East African point of view, would be a situation in which each country engaged in a competitive expansion of facilities, ensuring (under reasonable assumptions) that all would do worse than under a policy of co-ordination

Clearly the discount rate used in calculating the present values of net benefit streams will have an important influence on the ranking of alternative uses if the time patterns of the benefit streams have different shapes and if the streams cross. The literature on the appropriate rate to use provides several answers. Perhaps the best procedure is to indicate the sensitivity of the present value figure to different plausible rates of discount. (This procedure is the same thing as not deciding on the opportunity cost of capital, but rather making different assumptions about that magnitude.)

THE ON-SITE VALUE OF GAME VIEWING AS A FORM OF LAND USE

Insufficient information has been secured as yet to do all of the calculations which the above discussion suggests are necessary to evaluate game-viewing as a form of land use. This section presents some rough numbers on the on-site benefits only. These numbers refer to no particular game-viewing area. They have been built up using figures for several game-viewing areas in Kenya.¹ In spite of the fact that they refer to an imaginary game area, it is believed that they indicate the magnitudes involved with enough accuracy to serve as a basis for discussion.

¹The sources of information used are:

for the lodge: Annual and monthly accounts for 5 Kenya game lodges run by two different companies, plus detailed information on purchases of 3 lodges for a period of 4 months. For lodge construction costs, the Bill of Quantities of one Kenya game lodge plus interviews with the Quantity Surveyor for that Lodge and with some of the major suppliers of materials.

for the cost of the game-viewing area: Figures from the Kenya National Parks, together with interviews with the Director, Accountant, and one of the Park Wardens.

for the cost of transport in the game area: Interviews with tour operators.

To break costs down into foreign exchange and indirect taxation, much use was made of the Kenya Survey of Distribution 1960, Kenya Census of Industrial Production 1963 and E.A.C.S.O., Customs and Excise Tariff Handbook, September 1966. As well, interviews were held with several of the suppliers of major inputs into the game-viewing activity.

The basic assumptions¹ underlying the numbers are:

- (1) the game-viewing area is 500 square miles, with 200 miles of roads and tracks and three entrance gates;
- (2) a 100 bed lodge is built at a cost of \$150,000;
- (3) all visitors to the game-viewing area stay at the lodge;
- (4) 2/3 of the visitors arrive in parties of 6 in V/W combis, while the remainder come in parties of 3 in saloon cars;
- (5) each party travels 100 miles in the game area;
- (6) entrance to the area costs Shs.5 per visitor and Shs.10 per vehicle, room and board at the lodge cost Shs.100 per visitor day. Each visitor is assumed to spend Shs.32 in the bar, the lodge shop, and on tips.

Under the above assumptions, the gross contribution to NP of game viewing per acre can be approximated by:

- (1) If the capital used to develop the area is domestically owned,

$$P_{\perp} = -1.0709 + 0.00045 V, \text{ and}$$

¹Some comment on these assumptions is in order. Assumption (1) is necessary since we need to relate the expenditures generated by game-viewing to a specified area of land. If 500 miles is felt to be too large or too small, it is an easy matter to adjust the figures given below. Assumption (2) may be optimistic given the rate at which construction costs are rising in East Africa. At least in Kenya, however, it should not be impossible to build a lodge along the lines of Kilaguni, say, for this price today. Assumption (3) ensures that our figures will be on the conservative side. The nearer a game-viewing area is to large centres of population or existing game-viewing circuits, the larger would we expect the number of visitors who do not stay at the lodge to be. Assumption (4) may be a little conservative for some game-viewing areas at the present time. However, as tourism grows we can expect to see large numbers of tourists transported in 20 person buses as well as Combis, and this will tend to reduce the returns from those shown here. Assumption (5) was made on the basis of interviews with tour operators. Assumption (6) about prices reflects the current price structure of the Kenya National Parks and lodge prices in the County Council Game Reserves.

Other assumptions not stated above are: (7) the investment in the lodge is depreciated over 20 years, (8) no allowance is made for the fact that it takes time from the decision to develop until the area is actually in operation, (9) there is no allowance made for working capital or a return on furniture and fittings, crockery, etc. Depreciation on these items is considered, however. All of these assumptions result in the calculated returns being higher than they should be. (10) Finally, the extremely conservative assumption was made that all commissions paid to tour operators represent foreign exchange cost.

(2) if the capital is foreign owned, and is lent at the rates of interest shown,

Rate of Interest

$$6\% \quad P_1 = -1.2789 + 0.00045 V$$

$$10\% \quad P_1 = -1.7033 + 0.00045 V$$

$$20\% \quad P_1 = -2.5274 + 0.00045 V$$

where:

P_1 = on-site revenue less payment of foreign exchange associated with revenues, in shillings per acre.

V = number of visitors to the lodge and game viewing area.

The minimum net contribution to NP of game-viewing under the above assumptions on a per acre basis can be expressed by:

$$P_2 = 0.3846 + 0.000064 V$$

Where:

P_2 = tips, entrance fees¹, and indirect taxes in shs. per acre.

If we have projections of demand for the game-viewing areas, on-site returns per acre can easily be calculated. If we can expect, say, 20,000 persons to make use of the area each year, P_1 will come to about Shs.3 per acre if the capital used to develop the area is domestic, and P_2 will be about Shs.1.66.

Alternatively, if we know how much the best alternative to game-viewing will yield, we can find out how many visitors, on the above assumptions, would have to make use of the area for game-viewing to yield an equal amount. For example, if pastoralism will yield Shs.5 per acre, we would have to expect about 13,500 visitors to make use of the area for game-viewing for this use to contribute as much as ranching. To put this figure in context, we might note that in 1966 game-viewers spent 70,300 nights in Kenya game-lodges, and that 53,600 of these were visitors.

¹There is a cost of collection of entrance fees and this should be netted out, but this cost is small and so is ignored here.

The maximum feasible year-round level of utilization of lodge capacity measured in terms of percentage bed occupancy depends upon whether the game area is open year-round, the seasonal pattern of demand, the steadiness of the day to day flow of visitors, the number of beds per room, the efficiency of the booking system, and the composition of visitors (single versus couples and families). With two beds per room, effective capacity is reached at 75-85% bed-occupancy on a monthly basis. With a third bed in each room (but counting capacity in terms of two beds per room) effective capacity is somewhat higher. If we take a 75% occupancy rate as being the capacity limit of the degree of development assumed above, the maximum P_1 would be about Shs.11.25 per acre if the area were developed by domestic capital, and about Shs.9.80 if it were developed with a foreign loan at 20% interest.

It is most unlikely that the same capacity constraint exists for game-viewing as compared with accommodation. Operating at 75% bed occupancy, there would be 75 visitors in the area each day on average, transported in about 8 combis and 8 saloon cars. This would imply that there would be about 12.5 miles of roads and tracks per party on average, although the number would be less on busy days or if we relaxed our assumption that the only visitors are those who make use of the lodge. While overcrowding is a subjective concept, and depends as much upon the topography of the area, the density of the game, the type of animals, and the expectations of visitors themselves as upon any rule of thumb relationship between miles of road and carloads of visitors, it is doubtful that with even 3 or 4 miles of road per party will overcrowding be sufficient to drive visitors away, or to require the lowering of prices to entice the same numbers to come. If this is so, it is worthwhile investigating the economics of building another lodge in the area (assuming that the demand exists). More intensive use of the existing game area would not occasion a doubling of costs, since the increased number of visitors would not occasion a proportional increase in roads or park administration. Therefore we would expect a doubling of capacity, at the same occupancy rates, to result in more than a doubling of profitability. A low estimate of the more intensively developed game

viewing area would be secured by doubling the profitability calculated on our assumptions above.¹

Two words of warning are in order at this point. First, if the demand to justify the larger capacity occurred in the future, we should discount back the benefits of the expansion to the present to produce a figure comparable to those for alternative uses.

Second, all of the above calculations are for on-site expenditures by game-viewers. They take no account of the fact that this area generates revenues which accrue elsewhere in the economy. If the area were visited by 16,000 people annually, each of whom generated Shs.20 of profitability elsewhere in the economy which could reasonably be allocated to the game-viewing area, the yield of game-viewing would rise by Shs.1 per acre. For larger numbers of visitors and larger amounts of off-site profitability, the yield would rise pro-rata.

CONCLUSION

The above model of a game-viewing area does not, unfortunately, follow all of the sound rules laid down in the first part of this paper. However, the assumptions of the model tend to give a conservative estimate on-site value of game-viewing. Traditional ranching in the pastoral areas yields perhaps Shs.5 per acre gross, and, after a substantial amount of investment and infusion of skilled manpower Shs.10 to Shs.20 gross (without netting out the payments of foreign exchange as we have done for game-viewing). It is clear that these areas will make a higher contribution to National Product if game-viewing is included among the uses to which the land is devoted than if it is not. Certainly the above numbers are sufficiently striking to warrant the recommendation that the potential of game-viewing be carefully considered in deciding the future of any piece of land which enjoys the scenery and animal stocks which would make game-viewing feasible.

¹Of course, if demand is high enough to make a second lodge an attractive investment, it is also high enough to charge higher prices for the existing lodge. To discover which course of action -- raising the price of the existing facility or building new capacity -- would pay most requires further analysis which cannot be done within the confines of this paper.