Agrekon

VOL. 12 No. 3 JULY 1973

REQUIREMENTS FOR CONTRIBUTIONS

Articles in the field of agricultural economics, suitable for publication in the journal, will be welcomed.

Articles should have a maximum length of 10 folio pages (including tables, graphs, etc.) typed in double spacing. Contributions, in the language preferred by the writer, should be submitted in triplicate to the Editor, c/o Department of Agricultural Economics and Marketing, Pretoria, and should reach him at least one month prior to date of publication.

The Journal is obtainable from the distributors: "AGREKON", Private Bag X144, Pretoria.

The price is 25 cents per copy or R1 per annum, post free.

The dates of publication are January, April, July and October.

"AGREKON" is also published in Afrikaans.

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The allocation of land among uses - a theoretical view

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INTRODUCTION

All economic activities require land to a greater or lesser degree. As soon as land is fully utilised, it becomes a scarce resource.

In various parts of the world the authorities have in the course of time included certain aspects of land utilisation in their general economic policy. Government intervention in land utilisation is therefore not a new concept.

In this article consideration will be given to the economic principles which are relevant in determining how land should be allocated among alternative uses and the degree to which Government intervention in the matter is desirable.

MAIN OBJECTIVES OF LAND UTILISATION AND POLICY

It would not be realistic to regard the goals set in land utilisation and policy in this connection as isolated entities. They must be seen as forming part of a greater whole - a whole made up of the broader objectives that the community is striving towards on a long-term basis and the broader targets of policy. All such objectives should be for the improvement of general economic and social welfare.

These objectives imply, among other things, an endeavour to maximise the social product over time. This entails weighing the preferences of particular individuals (or groups of individuals) against each other and against those of the community. Schickele[1] observes that there are fundamental differences between individuals and the community in their time preferences for land income. The short-term private motive of exploiting resources must therefore be curbed by the long-term social welfare motive of conservation and development. Individuals often maximise their immediate profit in such a way that it results in social costs that have to be borne by others; for example, farmers and city dwellers who must suffer because of pollution and future generations who have to manage with less or poorer resources or both.

A basic aim of land policy is therefore to institute a system of land utilisation and intensity of use which will yield the optimum long-term social product from land.[2]

As is the case with most problems of economic relationships, it is marginal analysis that must give guidance as to what the optimum situation will comprise. This optimum will be achieved if the application of all resources, including land, is such that the marginal value products of the following main alternatives are equal:

1. Current agricultural production
2. Current production in other lines
3. Future agricultural production
4. Future production in other lines[3]

It is therefore relevant at this stage to examine briefly the various possible uses of land and to discuss theoretical principles that can be used in providing guide-lines for land allocation.

LAND UTILISATION

The most important uses of land are the following: Agriculture and forestry, recreation, mining, transport and urban use. Because each of these uses makes specific demands on land, they will have to be discussed separately.

1. Agriculture and forestry

Agriculture and forestry make up one of the types of land utilisation that are most closely bound to the inherent characteristics of the land. The most important physical characteristics that determine the suitability of land for these purposes are the type, structure and texture of the soil, topography, the moisture regime of the soil, temperature and the biological life on the land. These factors alone give rise to big differences in agricultural use patterns. They largely determine what production the land is physically suitable for and therefore also what intensity of agricultural use is possible.

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1) Schickele, Rainer (1950). Objectives of land policy. In: Timmons, John F. and Murray, William G. (Eds.). Land problems and policies. Iowa State College Press, Ames, Iowa

2) Ibid.

3) Johnson, Sherman E. (1950). Principles of land utilization. In: Timmons, John F. and Murray, William G. (Eds.). Land problems and policies, op cit.

It is generally accepted that these natural factors, together with the economic location with regard to markets and transport communications, to a large extent decide the type and nature of farming.

Four important characteristics come to the fore:

(a) In comparison with other uses, agriculture and forestry require relatively large areas of land. It is certainly not by chance that in 1970 land was the most important capital asset in South African agriculture. The total capital assets came to R6 691 million. Of this amount, land value accounted for R4 887 million, in other words 72,9 per cent.[4]

(b) There are different soil quality classes for agricultural purposes. Certain soils are suitable for intensive agricultural production, others are not.

(c) Agriculture and forestry are not extractive land uses. If conservational production practices are employed, the inherent qualities of the soil can be maintained indefinitely, or improved.

(d) Certain other land uses, for example urban development, withdraw land permanently from agricultural uses.

2. Recreation

The nature of the population and its distribution pattern greatly affect the demand for land for recreational purposes. Certain natural characteristics - a combination of altitude or topography, climate, water sources and also animal and plant life - have a tremendous power of attraction for man from the point of view of recreation. Mountainous or broken terrain which makes land less suitable for intensive agricultural production is often precisely what makes the land exceptionally well suited for recreational purposes.[5] On the other hand, the same climatic characteristics often make land suitable for both agriculture and recreation. The presence of water sources and beautiful natural scenery as well as interesting animal and plant life are conducive to recreation.[6] The location in relation to population concentrations also has a marked influence on the value of land for recreation.[7] As land users agriculture and recreation are often supplementary or complementary to one another.

4) Abstract of Agricultural Statistics, 1972. Department of Agricultural Economics and Marketing, Division of Agricultural Marketing Research, Pretoria.

5) Renne, Roland R. (1962). Land economics. Revised edition. Harper & Brothers, New York, p. 71

6) Ibid., pp. 71-74

7) Johnson, Sherman E., op. cit.

3. Mining

Mining activities are governed by the content and quality of land. Minerals can only be exploited where nature has put them. Physical factors which influence the suitability of land for profitable exploitation vary considerably with different minerals. Whereas a given zinc or copper content in an ore would not make it profitable to exploit, the same concentration of gold or silver would make profitable exploitation possible. The influence of economic location also varies with different minerals. Economic location is extremely important in the case of a bulky product such as coal, but relatively unimportant in the case of diamonds.[8] There are obviously strong similarities in the principles of location in the agricultural and mining industries.

Mining has a few specific, important characteristics as a land user:

(a) The nature of the land is a supreme determining factor of its suitability for mining purposes.

(b) Mining is an extractive industry and mineral deposits are permanently removed from the land.

(c) Mining is an intensive form of land use.

Certain types of mining activities take place mainly underground, and in such cases the major part of the surface area can often be put to other uses.

4. Transport

Transport involves extremely intensive land use; it is a more intensive form of use than agriculture, forestry or recreation. It is usually more intensive than urban housing and often also more intensive than urban industries. Only in cases of rich mineral deposits does mining involve more intensive land use than busy traffic routes.

As regards natural characteristics, topography is an important factor influencing the location of transport links. There is a tendency to avoid steep hills and mountains when planning highways and railways. In spite of modern technology, the more level routes are usually preferred because they are cheaper. Apart from topography, natural characteristics of the land are not considered important in assessing the suitability of land for transport purposes.[9]

5. Urban use

On the whole, urban use comprises a number of closely related uses, namely the use of land for industrial and business purposes, densely populated urban residential areas and less heavily populated suburban residential areas. The smallholding complexes that so often mushroom around cities can also be classified as urban use; most

8) Renne, Roland R., op cit., pp. 75-76

9) Ibid., p. 85

of the inhabitants regard this land purely as a place to live and relax, but are, at least from the point of view of earning their living, members of the urban complex. In addition, urban use also includes the use of pieces of land for recreation. A considerable part of the land area in cities is taken up by traffic links.

The natural characteristics of the soil, topography, humidity and temperature, which are most important for agriculture are of relatively little importance in determining the suitability of land for urban uses. In fact, hilly surroundings are often preferred by wealthier groups for residential areas.

An important consideration, however, for both business and residential purposes is the location of a particular piece of ground in relation to other undertakings or residential areas. Short distances - sometimes less than a block - can make a big difference in the market value of land.[10]

Urban use of land is a more intensive pattern of use than agriculture and forestry production, recreation and often also mining.

RELATIONSHIPS IN LAND USE

It can be accepted as a matter of course that the higher the marginal financial or social value product of land is considered to be, the greater will be the demand for it and the higher its price. This is true both within and between classes of use. It is for this reason that a certain area of ground in Houghton will fetch a much higher price than a similar area in Booysens, although both pieces of ground are situated in Johannesburg and both are used for the same purpose, namely housing.

It is also for this reason that a higher price is paid for land intended for mining or urban use than for land for agricultural production.

As a result agriculture and forestry are in a poor competitive position in the land market; from a financial point of view, other users can take over land from agriculture with little difficulty. Various uses may be competitive, supplementary, complementary, or antagonistic.

For example, transport is necessary to link various centres and to move products, whatever their nature, to the consumer. On a long-term basis, therefore, transport is in this sense complementary to all other land uses. Consequently transport also has a key role in location theory. Transport does, however, vie with other uses for land and competitive relationships exist. It can also be antagonistic towards other uses, for example, when a highway or railway line cuts up a nature reserve to such an extent that it is no longer suitable for recreation, or breaks up a farm or area so that agricultural production suffers. It can also make land unfit for certain urban uses.

Another example of antagonism that is of growing importance today is pollution, by which one use often spoils the suitability of the land for another purpose.

Where there are antagonistic relationships, it is irrational to carry on both activities in the area concerned; one must be moved to another locality or stopped completely.[11] Much land has already been made quite unfit for its best use by unplanned jumbling of incompatible uses.[12] It would appear, therefore, that the mere existence of antagonistic relationships is sufficient reason for intervention by the authorities.

PRODUCTION ECONOMIC PRINCIPLES IN LAND UTILISATION

Production entails the application of inputs in order to supply products. If one or more of the inputs are fixed or non-variable, applications of the remaining variable inputs are subject to the law of diminishing marginal returns.

In this discussion, land in any locality will be regarded as a fixed input and all other inputs will be taken together as a single non-variable input used to produce a particular product. Diminishing marginal returns will therefore prevail in the application of other inputs for production purposes. If the quality of land is important in a particular production pattern, the total, average and marginal products of the variable inputs will differ on various classes of land. Optimum applications and, therefore, the optimum production will likewise differ on various classes of land. This principle is illustrated in Figure I.

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10) Ibid., p. 86

11) Heady, Earl O. (1960). Economics of agricultural production and resource use. Prentice-Hall, Inc., Englewood Cliffs, N.J., p. 221

12) Scofield, William H. (1963). Values and competition for land. In: Stefferud, Alfred (Ed.) A place to live. The Yearbook of Agriculture, United States Department of Agriculture, Washington, D.C.

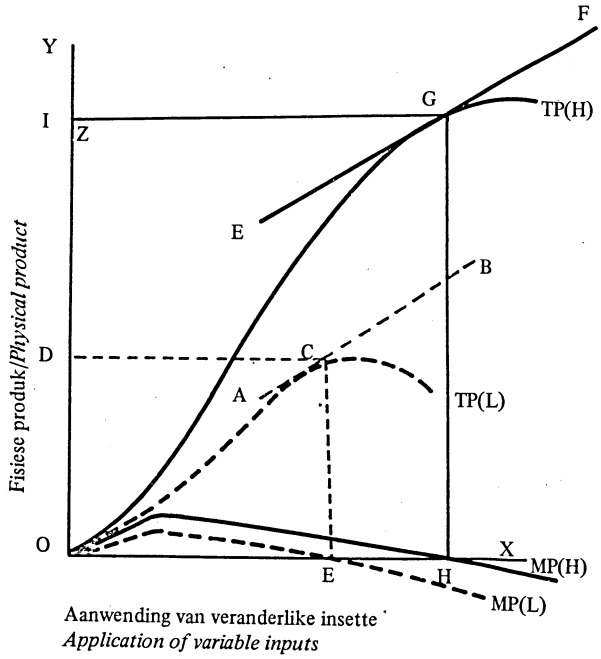

FIG. 1 – Die effek van die gehalte van grond op produksie
FIG. 1 – The effect of the quality of land on production

In Figure I the solid lines $TP_{(H)}$ represent the total and marginal products on high quality soil. The broken lines $TP_{(L)}$ and $MP_{(L)}$ represent the total and marginal products on soil of a lower quality. At any specific level of application of the variable input higher production is achieved on the high quality soil.

The economic optimal level of application differs on the two types of soil. This optimum is reached when the following obtains:

$$\frac{\Delta Y}{\Delta X} = \frac{Px}{Py}$$

where $\frac{\Delta Y}{\Delta X}$ = marginal product

Py = product price

Px = input price

The price ratio, $\frac{Px}{Py}$, is shown on the same graph by price ratio lines; where a point of tangency to the total product curve occurs, the above-mentioned condition is satisfied and production is at the economic optimum.[13] In Figure I it is assumed that the same price ratios hold on both qualities of soil. This implies, among other things, that the same quality of product will result, which is not necessarily true.

Under the assumed condition the price ratio lines will move parallel with one another. The broken price ratio line AB touches the total product curve for low quality soil at C. Therefore the optimal level of application of X is equal to OE and the optimal production level to OD. The gross margin is as follows:

$$Py \cdot OD - Px \cdot OE$$

In the case of the higher quality soil the solid price ratio line EF touches the total product curve at G; the optimal application is OH and the related production is OI. The gross margin is:

$$Py \cdot OI - Px \cdot OH$$

This ratio, $Py \cdot OI - Px \cdot OH$, is obviously greater than $Py \cdot OD - Px \cdot OE$.

The analysis therefore shows that if quality is important for a particular use the following deductions will be valid:

1. On high quality soil more variable inputs will be used than on low quality soil.

2. The production level will likewise be higher on high quality soil than on low quality soil.

3. On high quality soil production will be more profitable than on low quality soil.

The same reasoning will hold when other resources are kept constant and the amount of land allocated to a specific land utilisation group is changed. It is economically rational, where quality is important, to use more higher quality than low quality land.

The above deductions are abviously valid within a static framework. On a long-term basis, however, technological improvements result in upward movements in production functions. Estimates have been made as to the rate and consequences of technological change in the South African manufacturing sector. Bergman[14] found that during the period 1955-64 technological change took place at a rate of 2,5 per cent and that it contributed 47 per cent to the increase in productivity. Van der Dussen[15] analysed ten manufacturing industries individually and collectively. His collective analysis for the period 1955-56 to 1962-63 indicates increases in the productivity of labour and, particularly, of capital. During this period technological change was, according to him, responsible for 40 per cent of the increase in productivity, compared with a much smaller contribution between 1945-46 and 1954-55.

No such analyses could be traced in respect of South African agriculture. However, it was found that during the post-war period the production per

13) Heady, Earl O. op cit., pp. 98 - 105

14) Bergman, Leslie F. (1968). Technological change in South African manufacturing industry, 1955-64. S. Afr. J. Econ. 36: pp. 3-12

15) Van der Dussen, P.E. (1970). Post-war technological change in the South African manufacturing sector. Finance and Trade Review 9: pp. 91-112

primary resource unit[16] and per labour unit[17] increased considerably. It was also found that the capital-output ratio in South African agriculture, calculated on five-year moving averages, shows a downward trend since the decade 1949-1958,[18] and it can therefore be accepted that the productivity of capital in agriculture is also increasing. From these three trends it may be deduced that agriculture is also experiencing a period of technological progress.

Mining also shows decreasing capital-output ratios since 1953.[19]

It may be expected that in the future both technological development and its contribution will accelerate in all economic sectors.

In technological development, too, the quality of land plays a potentially important role. Where this quality is of importance in producltion it may be expected that the changes in production functions will take place faster on high quality than on poorer quality land. The development of a virus-resistant rootstock for citrus, for example, would have a greater profit increasing effect on high quality than on low quality land.

It must therefore be expected that in the production activities where the quality of land is important, the economic differences between the use of high and low quality land will increase as time passes.

WELFARE ECONOMIC PRINCIPLES IN LAND UTILISATION

A basic requirement for maximum welfare is that a point be reached where it is impossible to increase any person's consumer satisfaction without causing a deterioration in someone else's position.[20] Such a situation is reached when seven marginal conditions - often also known as Pareto optimal conditions - are satisfied. These conditions are the optimum allocation of products among individuals, the optimum degree of specialisation among producers, the optimum input-output ratio in production, the optimum allocation of inputs among producers of the same product, the optimum direction of production, the optimum allocation of the time of a factor unit (particularly between leisure and work) and intertemporal conditions for maximum welfare.[21]

This discussion will cover the fifth and seventh conditions, namely the optimum direction of production and intertemporal conditions.

The optimum direction of production consists of a ratio between the technical production conditions and the preferences of the consumer public. The premise is that in order to achieve maximum welfare, production must create the highest possible consumer satisfaction.

Let us look, at this stage, at the optimum ratio in which two products Y_1 and Y_2 can be produced. In order to produce the products, resources must be used. Because resources are limited, there are limits to the quantities of the products that can be produced. A graph known as the community production possibilities curve shows the maximum quantities of any two products that can be produced with the available resources. Any smaller production would be irrational and therefore not compatible with maximum community welfare. A community production possibilities curve is shown in Figure 2 by ABCD. This line is concave to the origin of the graph.

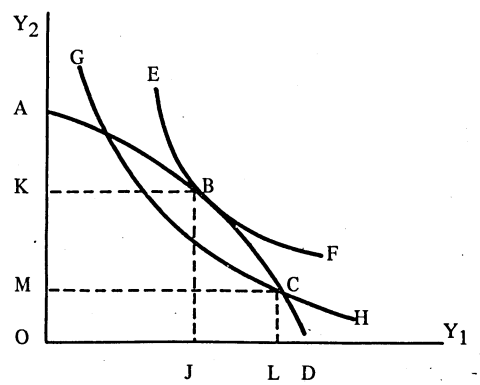

FIG. 2 – Optimum produksierigting
FIG. 2 – Optimum direction of production

16) Groenewald, J.A. (1964). Changes in primary resources in the South African agriculture. Agrekon 3 (3): pp. 22-29

17) Brand, S.S. and Tomlinson, F.R. (1966). Die plek van die landbou in die Suid-Afrikaanse ekonomie. S. Afr. J. Econ. 34: pp. 26-49

18) Du Piesanie, C.J. (1968). Die bepaling en die gebruik van kapitaalopbrengsverhoudings. M.A. (Econ.) thesis, University of Pretoria, p. 80

19) Ibid. pp. 74, 82-85

20) Reder, Melvin Warren (1963). Studies in the theory of welfare economics. Columbia University Press, New York, p. 21

21) Ibid., pp. 21-38

With regard to consumer satisfaction, community indifference curves are used to show all the combinations of Y_1 and Y_2 that as consumer items provide the same satisfaction to the community. Such curves are convex to the origin. Naturally a whole series of such community indifference curves can be drawn; the further such a curve is from the origin, the higher is the consumer satisfaction it represents.

In order to maximise welfare, the community indifference curve furthest from the origin, but still within reach of the productive possibilities of the resources, must be attained. This curve will be tangent to the community production possibilities curve. Figure 2 shows the optimum position. The curve EBF is tangent to ABCD at B, and this point represents a pattern in which OJ of Y_1 and OM of Y_2 are produced and consumed. Any other combination is represented by another point, such as C, on the community production possibilities curve. This point occurs on another community indifference curve - in this case GCH - which represents lower consumer satisfaction and therefore lower welfare. At the point of contact B the slopes of ABCD and GBF are equal.

The slope of ABCD $= \dfrac{\Delta Y_2}{\Delta Y_1}$

$$= \frac{\Delta Y_2}{\Delta (X_1 \dots X_g)} \Big/ \frac{\Delta Y_1}{\Delta (X_1 \dots X_g)} \qquad (1)$$

$$= \frac{MP\ (X_1 \dots X_g)Y_2}{MP\ (X_1 \dots X_g)Y_1}$$

The slope of EBF $= \dfrac{\Delta Y_2}{\Delta Y_1}$

$$= \frac{\Delta N}{\Delta Y_1} \Big/ \frac{\Delta N}{\Delta Y_2} \qquad (2)$$

$$= \frac{MNY_1}{MNY_2}$$

$$\therefore \frac{MP\ (X_1 \dots X_g)Y_2}{MP\ (X_1 \dots X_g)Y_1} = \frac{MNY_1}{MNY_2} \qquad (3)$$

where $X_1 \dots X_g$ = inputs of production factors

$MP(X_1 \dots X_g)Y_i$ = marginal product of $(X_1 \dots X_g)$ in the production of Y_i

N = utility

MNY_i = marginal utility of Y_i

It appears, therefore, that the one essential condition for maximum welfare is that the marginal rate of substitution in production and consumption be the same between any two products.

Intertemporal conditions for maximum welfare arise out of the dynamic time pattern according to which production and consumption take place. Every economic entity - producer or consumer - is continually faced with choices as to how inputs or products should be distributed over time. A consumer, for example, has a choice between immediate spending on one hand or, on the other hand, saving with a view to later spending.

In production indirect patterns are used in that intermediary production agents are manufactured from primary products or resources which are only eventually used to manufacture final consumer products.[22] It is precisely this indirect production which gives rise to problems in deciding input quantities at different times.[23]

Therefore, just as there is, at any particular point in time, a choice between the relative quantities of various commodities or inputs that can be consumed or used, there is for every such a commodity a choice of different times of use.

This choice may be dealt with in respect of any commodity by drawing indifference curves representing the pattern of preference of any individual in respect of relative quantities of the same article at two points in time.

In Figure 3 the time preferences of two individuals, A and B, in respect of two points in time at which X may be consumed are represented by X_t and X_{t+1}. A box diagram is used in which the preferences of both A and B are represented, but the graphs for B are upside-down. A's axes and indifference curves are represented by solid lines and B's by broken lines.

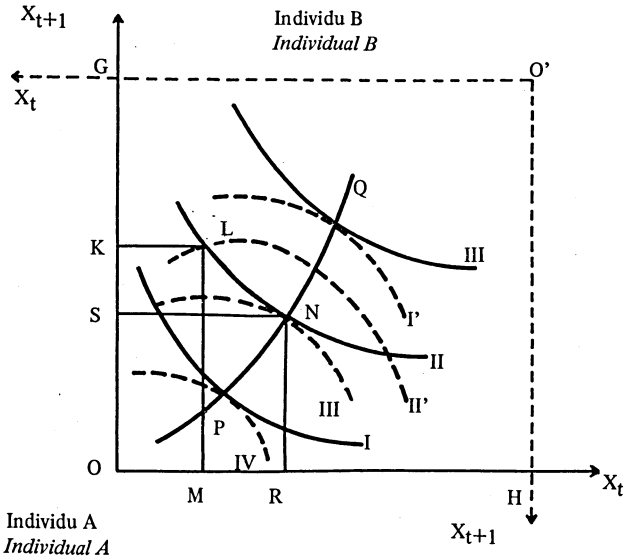

FIG. 3 – Tussentydse voorwaardes vir maksimum welvaart
FIG. 3 – Intertemporal conditions for maximum welfare

22) Schumann, C.G.W., Franzsen, D.G., de Kock, Gerhard (1964). Ekonomie. 'n Inleidende studie. Universiteits-uitgewers en Boekhandelaars (Edms.)Bpk. Stellenbosch, p. 361

23) Hicks, J.R. (1961). Value and capital. Oxford University Press, London, pp. 192-197

OH and OG represent, respectively, the total quantities of X_t and X_{t+1} available for the two people.

$OH = O'G$
$OG = O'H$

The indifference curves I, II and III represent the three indifference curves for individual A. The indifference curves I', II', III' and IV' represent individual B's preferences.

Supposing that consumption occurs at point L, individual A's pattern of consumption will be OM in period t, and OK in period t+1. Then B uses MH in period t and GK in period t+1. By changing the allocation of X between the two it is possible to increase the utility of one of the two without reducing the utility of the other, or to increase the utility of both. By definition either of these two alternatives will contribute to increased welfare. In Figure 3 the allocation is changed to point N, with the result that A now uses OR in period t and OS in period t+1. B's use is changed to RH in period t and SG in period t+1. In this way B has reached a higher indifference curve, while A is still on the same indifference curve. Welfare has therefore been increased. At this stage it is interesting to note that N does not represent a unique optimum.

P and Q also represent optimum situations, and a line joining P, N, Q and other such points is a contract curve. Where any point on the contract curve represents a Pareto optimal situation, every point that is not on the contract curve is sub-optimal.

At any point on the contract curve, for example N, the slope of the two individuals' indifference curves is equal. The following algebraic conditions are therefore valid:

Individual A		Individual B
$\frac{\Delta X_{t+1}}{\Delta X_t}$	=	$\frac{\Delta X_{t+1}}{\Delta X_t}$
$\frac{\Delta N}{\Delta X_t} \frac{\Delta N}{\Delta X_{t+1}}$	=	$\frac{\Delta N}{\Delta X_t} \frac{\Delta N}{\Delta X_{t+1}}$
$MN\,X_t / MN\,X_{t+1}$	=	$MN\,X_t / MN\,X_{t+1}$

where N and MN have the same meaning as before.

In order to achieve maximum welfare, the marginal rate of substitution between resource control at any two moments in time (t and t+1) must therefore be the same for any two individuals or firms, A and B.

IMPLICATIONS FOR LAND UTILISATION

The preceding discussions show briefly that the following factors must be kept clearly in mind when it comes to land allocations:

1. Certain uses make land permanently unsuitable for some other uses.

2. Competitive, supplementary, complementary, or antagonistic relationships exist between various classes of land use; it is economically irrational to allow antagonistic activities in the same area.

3. If the quality of land is important to a particular user group, optimum allocation of production factors and optimum production are greater and also more profitable on high quality land. The existing gap becomes wider in the course of time as a result of technological development.

4. An optimum direction of production requires equal marginal rates of substitution in consumption and production in the community.

5. Taken over time, if maximum welfare is aimed at, the marginal rate of substitution at any two times must be the same among different people.

The principle of the optimum direction of production must also be considered in the light of the alternative cost principles. If land is used for a specific purpose A it is not used for purpose B. Because it is not used for purpose B, the community forfeits a certain amount of utility or production and the non-use of the land for B therefore involves a cost to the community. This cost must be weighed against the benefit the community receives from purpose A. If the quality of land is unimportant for purpose A, the benefit to be obtained is equally great on poor or good land. If, however, the quality of land is important for use B, it will mean that the loss of benefit from B will become greater, the higher the quality of land used for purpose A.

It has already been stated that quality of land as such is of little significance for housing and most industrial purposes. It is, however, of fundamental importance for agricultural production purposes. It is therefore clear that, if both good and poorer agricultural land are available for the stated urban uses, there is a definite cost to the community if the land with higher agricultural potential is used for these urban purposes and welfare is therefore reduced.

As has already been mentioned, technological changes in time bring upward shifts in production functions in the agricultural sector and this upward shift is greater on high quality than on low quality soils. The result is that the social cost of using high-quality agricultural land for other purposes increases with time.

Consequently the long-term welfare-reducing effects of indiscriminate alienation of high-quality agricultural land are likewise greater than the short-term effects.

In other cases two competitive or antagonistic uses, let us call them C and D, can be compared. In such a case quality of land may - by location or by quality - be important to both, but more so to D than C. There will therefore be an increase in utility if good rather than poor land is used for C. At the same time it involves a social cost. Both can be greater on a long-term basis than on a

short-term basis. The important point here is that the alternative cost principle remains valid. The increase in utility (or production) should, in order to ensure high levels of welfare, be weighed against the related social cost.

Therefore to assert, for example, that high-density traffic should always be given priority over less extensive uses is, from the point of view of welfare economics, a false argument. It may often be possible for alternative routes to be built with relatively small differences in cost or effectiveness. In such cases the potential production value of land for other purposes must be considered thoroughly - a matter which evidently receives scant attention in South Africa. It is doubtful whether the use of large areas for the development of roads through the highly productive vineyards of the Hex River Valley has benefited the welfare of the country in the long run. It is also very doubtful whether the planned highway systems through Pretoria's Fountains Valley or through the Wilderness near Knysna and George are in the best interests of national welfare, considering the tremendous potential for recreational purposes or nature conservation that may be permanently destroyed for future generations.

As regards intertemporal conditions, it must be realised that these conditions are tied with interpersonal preferences. The fact is that great disturbances can occur in this connection in unplanned, relatively unplanned, or poorly planned conditions.

Speculators, aiming almost exclusively at profits, may often seriously disrupt the harmony of these conditions. In this way situations arise in which the time preference scale of a small group of people completely overrides that of the majority of the community and the intertemporal conditions for maximum welfare are therefore not achieved. Scofield[24] mentions, for example, that much land in the U.S.A. has been utterly ruined from the point of view of the best use by indiscriminate mixing of incompatible uses. He also blames speculators for much of the unbalanced and unsystematic development around American cities. In addition, research findings are quoted showing that urban land prices are unnaturally high; the so-called scarcity of urban land is artificial and is maintained by holding back a greatly underestimated supply in the expectation of a highly overestimated demand for such land. These artificial high prices result in land that is exceptionally suited to certain urban purposes not being used for those purposes. Consequently other land is obtained for these purposes - sometimes high-potential agricultural land - and this urban expansion greatly increases the cost of local services.[25] The growth along the periphery of urban areas also often robs the city of strong leadership and robs the suburban dweller of a say in the management of the city of which he is in reality a part.[26] In South African urban areas similar conditions obtain. For example, it was recently authoritatively stated that, as a result of poor planning, a city such as Pretoria is losing the potential planning advantages which, as a fairly young city, it could have had.[27]

Such conditions are certainly not beneficial to welfare. The authorities therefore have an important function to fulfil in this connection.

In South Africa's rural areas, too, a process is taking place that is frustrating balanced development. A study committee headed by Prof. F.R. Tomlinson has shown clearly that a speculative cutting-up process, in which productive agricultural land is divided up into unproductive, uneconomic smallholdings, has been rampant for several years.[28] It is to be hoped that a recently passed law (Act 70 of 1970) will put an end to this process.

There are also places, such as the Hex River Valley which has already been mentioned, where road development has made high-quality land useless for agricultural purposes. In other areas urban uses often still unnecessarily take over highly productive agricultural land - for purposes for which quality of land is of little importance. South Africa has, for example, only small areas that, by the interaction of soil type and climate, are suitable for the cultivation of high-quality red table wines. All this land is in danger of being swallowed up by urban development. In the Constantia Valley which has traditionally produced some of the best red wines in the world desperately little land is left for this purpose.[29] In this way the potential for agricultural production is completely destroyed in some parts. The authorities should ask themselves seriously whether the country can afford such a process - particularly because high quality agricultural land is extremely scarce in South Africa and also in view of the fact that the economic progress of the country will be severely disrupted if the productivity of the agricultural sector lags.

In order to achieve the desired end, the community will have to accept the need for environmental planning - notwithstanding the deep-seated desire to be allowed to decide individually. It is, however, also necessary that within the framework of public interest, public intervention in private decision-

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24) Scofield, William H., op. cit.

25) Ibid.

26) Bain, Chester W. (1963). The annexation of fringe territory. In: Stefferud, Alfred (Ed.). A place to live, op. cit.

27) Devine, Brian (1973). Pretoria is in danger. Simon van der Stel Foundation, Bul. 27, p. 4

28) Republic of South Africa (1968). Verslag van die Interdepartementele Studiekomitee oor die gebruik van Landbougrond. Confidential report

29) Biermann, Barrie (1971). Rooiwyn in Suid-Afrika. Buren-uitgewers, Cape Town, pp. 50-59

making be kept within reasonable limits.[30] It therefore boils down to the need for zoning to reserve land for specific uses. Within user groups, however, it must be left to the individual to use his land and other resources at his own discretion, subject to the condition that his actions do not create dangers to the community such as soil erosion or any other form of pollution. In this respect the term "pollution" must be taken in its wider sense.

In certain South African cities or metropolitan areas considerable progress has already been made with zoning. Whether full consideration has been given to the factors dealt with in this article in all these zonings is, however, another question, the answer to which does not fall within the scope of this article.

However, quite apart from the existing urban zoning, there is also a need to reserve the high-quality agricultural land for the agricultural sector, except in cases where welfare considerations do in fact justify a transfer of such land to other sectors. The fact that it is not important to reserve low-quality agricultural land for the sector, as well as the fact that there can be many land quality classes, makes it imperative to carry out thorough land classifications in all areas where other uses compete with agriculture for land. In this way agricultural zones can be included, on a broader basis, in regional plans.

Although this concept is relatively foreign to South Africa, it is by no means a new one. For example, as early as 1963, exclusively agricultural districts had been zoned in a number of states in the U.S.A. These states include, among others, important agricultural production states such as California, Illinois, Indiana, Iowa, Kansas, Ohio, Washington, Wisconsin and Pennsylvania. In these zones agriculture is the main land use and other permissible uses are secondary and additional. Purely residential use, non-agricultural businesses and industrial activities are prohibited.[31]

Obviously only high-quality agricultural land should be proclaimed as exclusively agricultural zones. This is simply a logical step in an economic policy aimed at balanced growth and maximum welfare.

SUMMARY

Land is a production resource that is used in all economic activities. Some activities involve more intensive land utilisation than others and are therefore in a stronger competitive position on the land market. In this respect, agriculture is one sector that is in a weak competitive position.

The quality of land is important for certain classes of use, but unimportant for certain other types of use. If land which is regarded as high-quality land for the first group of activities - including agriculture in particular - is used for purposes for which quality of land is not important, this is a departure from one of the basic principles of welfare economics; it therefore leads to reduced welfare - particularly in the long-term. In South-Africa many such cases occur.

Unplanned, speculative handling of land likewise results in a deviation from intertemporal conditions for maximum welfare. This also often happens in South Africa.

Therefore the authorities, if they wish to pursue a policy of maximum welfare, cannot allow land use or misuse to continue without planning. Government policy will therefore also have to control land allocation, and for this zoning is necessary.

Within this framework high-quality agricultural land must be reserved for the agricultural sector. In the absence of such zoning, welfare will suffer.

30) Stollman, Isreal (1963). The uses and principles of planning. In: Stefferud, Alfred (Ed.). A place to live, op. cit.

31) Solberg, Erling D. (1963). Old and new principles of zoning. In: Stefferud, Alfred (Ed.). A place to live, op. cit.