FARM PLANNING ON THE BASIS OF LAND CAPABILITY SURVEYS

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The uses of Land Capability Surveys have already been enumerated ; the intention of this paper is to indicate the limitations of such surveys — or rather to enlarge on the perspective into which such surveys must be fitted. Clearly, soil surveys and land capability assessments have a basic function to fulfil in agricultural planning — but alone a land capability survey is no panecea for problems in agriculture ; the aim of this paper is also therefore, to indicate the role of other disciplines.

A useful approach to obtaining perspective may be to establish a working typology of the many disciplines required in agricultural planning. Naturally, we each tend to emphasise our own contribution. I will be inclined to think statistics are the prime requisite of planning, while the economic planner will consider his contribution as the most down to earth !

Let us not forget, however, that even in societies where the most highly centralised planning is attempted and where the public sector is virtually the only 'sector' — no amount of planning is worth more than the paper it is written on — except perhaps in the virgin lands — unless the people and especially the farmers, are willing and able to co-operate in carrying out the plans. In more formal terms, we posit that agricultural planning in the context of our societies is permissive or indicative (or else merely negative).

We are primarily concerned here with macro-planning, the further assumption being that micro-planning, farm planning or estate management, will fit, or be fitted in, with a macro-plan when a concensus on such a plan is established.

The aim of planning is to so allocate resources as to maximise the creation of wealth. Macro-planning for agriculture must be undertaken in the context of total resources planning. It may well be that the soil of Woodford Square, the heart of the City, is ideal for growing sugar cane, but no sane planner would suggest this.

In planning three phases of work may be distinguished:

1) resource assessment: an appraisal of what exists;
2) actual planning: the determination of feasible, optimum resource combination; and finally,
3) the execution of the policies and programmes to effect the plan.

Of course the phases overlap and are not discrete, but the disciplines required are so different for each phase that to determine our typology, these three phases of planning must be separated.

A further classification into physical and economic planning may be useful, particularly at the assessment stage and especially in agricultural planning. The factors to be assessed are land and other physical resources such as water, capital assets both physical and financial, and human resources. The assessment must be made in terms of political, social, economic and physical characteristics. If the direct aim of planning is to maximise wealth, the underlying aim is to maximise welfare and it is for this reason that the planner, at least in a democratic system, needs to take political and social criteria first and last, even though the physical resources are the basis of all analysis and planning.

More particularly in the assessment phase of planning, the disciplines which must be brought to bear include the physical sciences such as geology, minerology, climatology, agronomy, chemistry, topography, cartography; and the non-physical or social sciences such as economics, sociology, demography and statistics.

Planning is of course an almost 'god-like function' combining all these sciences, but if one distinguishes the physical from the social, then of the social sciences, it is economics which will encompass all the others and rule the hierachy of disciplines needed for planning. Similarly in the physical field it seems to be the function of the town and country planner to combine the various sciences and co-ordinate the policies.

Thus far we have established the three phases or functions of the planner, enumerated the phenomena to be studied and disciplines needed to assess resources. We can then begin to see the role of the land capability survey in planning as one of the tools of assessment in the physical field. In the second phase of the planning process however, it is necessary to combine the information given by the land capability survey with studies of the various economic and social phenomena before actual development plans can be made.

The tentative typology set out in the chart attached at Appendix I indicates the role of the land capability survey as one of the tools of assesment, whereas in the second or planning phase it can be seen to be subordinate to the overall needs of town and country planning. In the third stage the land capability survey may enter as a means of determining the details for development operations.

The Other Tools — (1) Town and Country Planning

Town and Country planning uses economic and social criteria as well as physical; it deals with all physical resources not only agricultural. Because it is at a higher level of generalisation, town and country planning has little to offer towards more detailed agricultural planning in that having observed the data of land capability survey, the economic and social factors are used to determine the 'highest and best use' of land and this may override the land capability assessment. For example, one area of valuable agricultural land is the Aranguez vegetable garden area, but whatever the assessment of its agricultural contribution, the fact that it is in the path of urban growth may mean it must go to housing.

In fact when the desired land use pattern is developed, our Town and Country Planning Department does not purport to recommend agricultural land use in any detail. Their approach is almost negative in that land which is not yet or not intended for development, i.e. building, is left for agricultural use. The determination of its agricultural use is left to the land capability recommendations. The land capability survey will decide whether this residual undeveloped land will be agricultural or for forest and conservation purposes.

(2)..Land Valuation

Another aspect of planning resource-use which overlaps the physical and economic is land valuation. Agricultural planning must take into consideration the limits set by another "higher" land uses and still using the techniques of physical assessment (survey and cartography), the valuer arrives at an economic valuation of the land and capital resources. Valuation can be a tool for development as well as a revenue gathering instrument.

The Cope's Report on Valuation indicates that it is possible to effect agricultural planning in part through the use of a graded valuation and tax policy. The report suggests that agricultural lands can be differently valued according to the land capability

recommendations and that such a system will usefully penalise the holding of idle or under-developed resources. It is suggested that a land capability survey and indeed a town and country planning zoning system may actually affect and inflate the market value of certain land areas. To allow this, is to allow speculation to replace development, unless the planning is carried to that stage which will push resources to the desired use. One of the complementary instruments to a land capability survey and a town and country plan is therefore a land tax policy.

Having dealt briefly with the main aspects of physical planning we may now turn to consideration of the economic and social aspects of agricultural planning and their relationship to the land capability survey.

The Land Capability Survey report for Tobago perhaps gives the best indication of the limited terms of reference for such surveys :

"Scope of Project"

"The purpose of this study is to determine the agricultural capability of the various soils of Tobago. A detailed soil survey has been completed, and in addition existing information has been integrated on which crops these soils will support.

It is recognised that the economic feasibility of any given crop is affected by many continually changing factors such as world and local markets, price supports, technological progress, and availability of adequate labour, management and capital. These factors are not considered in this report.

The study is not, by itself, sufficient to be used as the sole criterion to determine which crops and which farming systems are ideally suited for a given area. However, important scientific information is given which is vital, before more detailed agronomic and economic studies may be undertaken. Eventually it should be possible to make the most efficient use of these lands.

Future studies must include :

(a) The economics of growing specific crops on specific soils.

(b) Information on conservation-farming on steep slopes.

(c) Rotation of cultivated crops.

(d) Responses to fertilizers.

(e) Evaluation of new varieties of "older" crops.

(f) Evaluation of new food, pharmaceutical, essential oil and fibre crops.

(g) Response to irrigation.

(h) Evaluation of water resources available for irrigation.

These studies may require considerable time. In the meanwhile, this report is a valuable document in the hands of trained agriculturists. There is a wealth of information contained herein, concerning the chemical and physical properties of the soils of Tobago. Such information may be used to prepare technical crop/guide sheets along rational lines."

So far as macro-planning for agriculture is concerned, it is the second paragraph which matters most. However, before considering the economic aspects of planning in any detail, it should be noted that at least land capability report has an important limitation in the context in which we are considering uses of a land capability survey. This limitation is that almost no attempt is made to qualify the information. Appendix II of the Report gives the acreage of each soil type by slope class and we can therefore see that only 40% approximately is of the three better classes, slope class A, B or C ; in the rest the slope/erosion danger will automatically indicate a reduced capability class. The acreage of each soil type is also given according to the capability class, and we can therefore see the amount of land in each class. It is shown for example that 56% of the land has a capability of IV or higher. It would be much more helpful, however, if the analysis of such data extended to existing land use, related this to capability and indicated how much land is in the recommended use and how much is not[1]. This might then be a starting point for the economic planner. Some analysis in quantitative terms could, of course be undertaken now, after the reports are completed. It is not clear how much quantitative data exists to be analysed[2]. The planner may wish to relate capability to other factors such as tenure and type of holder. For example, a tenant farmer on short term could not be expected to undertake investment in soil conservation as readily as a well capitalised company. Or, for example, if all the Crown lands is class V and lower there may be no hope of supplying land to farmers. Perhaps it is not the responsibility of the land capability survey team with

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1 Attention may be drawn to a study "Aerial Photography Applied to Land Use" by W. G. Collins, Lecturer in Surveying and Photogrammetry, University of Leeds. Nov. 1966.

2 Using only the published Report, an attempt was made to draw together the land use and the capability class to classify the acreages by land use. However, only the broadest grouping was possible in that the land use given was not precise. See Appendix II.

their own special skills to undertake this statistical anlysis ; theirs is already a formidable task.

Granted this restriction, what the land capability survey does do, is make the basic compilation, and thereby set the limits of what is physically feasible, in the context of the present state of technology. But as this Report itself says land capability survey is far from being the sole criterion to determine which crops should be grown. If one says there are x acres of class I land which is defined as capable of growing anything, then economic or some other criteria must be used to choose which crops shall be grown. If one says there are x acres of class I land which is defined as capable of growing anything, then economic or some other criteria must be used to choose which crops shall be grown. In fact the "choice" by an individual may well be fixed by custom, his personal experience and his investment capital rather than by costs and market prices, but any way his criteria will be other than those of the land capability survey.

Ideally, the macro-planner would want to work towards optimising returns to the whole national farm. If cost studies were undertaken and then an assessment of market prospects made, it should be possible to fix together a matrix of choices and build up to an optimum pattern for the whole country. There would be many elements to be joined, the land capability data would be only one of the parameters on the supply side. But it is not beyond the limits of computer science to devise appropriate programming to create such a plan.

In the absence of statistical data emerging from the land capability survey it is difficult to see exactly how the Report can be used for economic planning. If one is to use statistical data on land use which comes from other sources such as an Agricultural Census, then it is difficult to see how this can be related with any accuracy to the land capability recommendations. Yet the planner must use some statistical data to make his assessment and in order to build up the recommendations for changes and developments. The kind of data he will require include :

(1) Land use and area of crops and pastures ;
(2) Crop and livestock production ; and
(3) Yields.

It would be desirable to link these with capability data ; if

not, then purely statistical data must be used [3].

It will be necessary to have farm income and expenditure data as well as costs of production. Such data are essential to farm management studies. The farm management studies have functions at several levels; for use in extension advice and training of farmers to improve output and returns, as indicators of feasible development projects in a special district, and finally at the level of national accounts and planning.

If such studies are available it becomes possible by linking them with related areas of capability, so that in addition to a technical guide sheet the farmer could be given economic guide lines. Such economic guidance may be a crude instrument at first but it may be refined over time.

For example, the technical guide sheet derived from the land capability survey for a capability class II sandy clay loam suggests that virtually any crop will succeed. The present land use may be coconuts, pasture and ground provisions. What should the farmer do to improve his returns? Depending on his labour situation and available capital, on the agronomic problems of his coconut yields, the steady price for copra may well keep him in coconuts, but if he can be shown a higher return with beef cattle he may find the capital to expand this enterprise. Advice on such a choice will depend on the relative costs and returns to the different enterprises. This may be obtained from other case-studies and from general market reports; farm management studies will define more precisely what could be done.

Conclusion

We have shown where a land capability survey fits into the overall pattern of planning functions. We have indicated how some of the main tools of planning may be used in conjunction with land capability survey. We have also shown that they will be used whether or not land capability survey is available. We may therefore now conclude that the main functions of land capability survey in planning are to provide a basic assessment of land resources and to fix the outer limits of what might be feasible.

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3 A preliminary attempt to compare land use data from the land capability survey with data from Agricultural Census 1963 and the Land Utilization survey 1956 has been made in Appendix III. However, differences of coverage and definations obviate any detailed analysis being made.

The area which might most usefully be explored is that of programming a complete indicative plan to project long term trends. While the land capability survey has many functions besides those relating directly to planning, we may conclude that for planning it it primarily an instrument which the economist must use if he can; the land capability survey is not an end in itself.

APPENDIX I

Typology of Planning Functions and Techniques

Phenomena	Functions: Assessment (1)	Planning (2)	Execution (3)
(i) Physical	*Techniques*	*Techniques*	*Techniques*
minerals	minerological survey		
power	water and power surveys		
water	geological)	Town and Country Planning	Land and Resource use policies
land	topographic) Land		
buildings	climatic) Cabability		
	soil) Survey		
	land use)		
(ii) Economic			
industry	industrial survey	Economic Planning	Economic, financial and investment policies
commerce and services	distributive survey		
(iii) Social			
income	housing surveys household budgetary and labour force surveys	Social Planning	Social welfare policies
population	population census and demographic surveys		
education	education survey manpower survey		

APPENDIX 11

Table I. Tobago – Acreage by Land Use(1) and by Capability Class

(Acres)

Land Use	Total	Land Capability Class						
		I	II	III	IV	V	VI	VII
Total	73.536	682	3,350	16,395	15,872	21,027	10,542	668
%	(100.0)	(0.9)	(11.4)	(22.3)	(21.6)	(28.6)	(14.3)	(0.9)
Crops and Pastures	40,353	682	6,936	16,395	15,458	72	–	–
1. Coconuts, Coconuts and Pastures	1,724	682	476	290	276	–	–	–
2. Pasture, Ground provisions and pasture, Ground Provisions	698	–	–	606	92	–	–	–
3. Ground Provisions and coconuts, Pasture and scrub	11,557	–	366	7,876	3,243	72	–	–

APPENDIX 11 (Cont'd.)

Table I. Tobago – Acreage by Land Use(1) and by Capability Class

(Acres)

Land Use	Total	Land Capability Class						
		I	II	III	IV	V	VI	VII
4. Coconuts, Ground provisions and Cocoa and bananas	22,613	–	6,094	7,089	8,620	–	–	–
5. Ground provisions and Cocoa	3,761	–	–	534	3,227	–	–	–
FOREST AND LASTRO	32,165	–	–	–	–	20,995	10,542	668
6. Forest and Scrub	32,165	–	–	–	–	20,995	10,542	668
NON CULTIVABLE	1,018	–	604	–	414	–	–	–
7. Swamp, sedges	676	–	604	–	72	–	–	–
8. Other, not specified	342	–	–	–	342	–	–	–

(1) L. C. S. Report descriptions of land use grouped according to if crops or not, where description refers to both crops and forest it has been assumed that the forest is in the lower capability class and crops in the upper 3 classes.

APPENDIX II

Table 2. Comparison of Land Use Acreages Tobago 1956, 1963 and Land Capability Survey.

(Acres)

Survey	Land Use			
	Total	Crops and Pastures	Forest and Lastro	Non-Cultivable
	(1)	(2)	(3)	(4)
1956 Land Use Survey				
Occupiers of 100 acres and over	33,900	14,500	18,600	800
o/w Government*	(11,700)	(1,700)	(9,800)	(200)
Non-Government	(22,200)	(12,800)	(8,800)	(600)
Operators 1 – 100 acres	20,500	14,200	4,900	1,400
Total 1 acre and over	54,400	28,700	23,500	2,200
% '' '' '' ''	100.0	52.8	43.2	4.0

APPENDIX 11 (Cont'd.)

Table 2. Comparison of Land Use Accreages Tobago 1956, 1963 and Land Capabality Survey.

(Acres)

Survey	Land Use			
	Total	Crops and Pastures	Forest and Lastro	Non-Cultivable
	(1)	(2)	(3)	(4)
1963 Agricultural Census				
Holders of 100 acres and over	32,500	14,100	17,200	1,250
o/w Government*	(11,700)	(1,700)	(9,800)	(200)
Non-Government	(20,800)	(12,400)	(7,400)	(1,050)
Holders of 1 – 100 acres	25,000)	18,400	6,150	400
Total 1 acre and over	57,500	32,500	23,350	1,650
% '' '' '' ''	100.0	56.5	40.6	2.9
1963 Land Capability Survey (a)				
Total all land	73,500	40,300	32,200	1,000
% '' ''	100.0	54.8	43.8	1.4

* 1956 estimate of Government land applied to 1963.

(a) Coverage differs, mainly through inclusion in L. C. S. of :

(1) Public service areas e.g. roads.
(2) House lots and holdings under 1 acre.