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C. Vita-Finzi, Ph.D., University College, London
J. Renfrew, Ph.D., University of Sheffield
D. Webley, B.Sc., D.I.C., M.A., Agricultural Development and
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Research Associates:

A. J. Legge, B.A., Churchill College
R. W. Dennell, B.A., Pembroke College
D. A. Sturdy, B.A., Trinity College
P. F. Wilkinson, B.A., Gonville and Caius College (Musk-ox Project,
College, Alaska)

Collaborators:

D. H. French, Ph.D., Director of the British Institute of Archaeology
at Ankara
G. C. Hillman, B.Sc., University of Reading
J. A. Charles, B.Sc., M.A., A.R.S.M., C.Eng., I.A.M.M., F.I.M.,
Department of Metallurgy, Cambridge University
R. J. Payne, B.A., Girton College

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PAPERS IN ECONOMIC PREHISTORY

**Studies by Members and Associates of the
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Early History of Agriculture**

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E. S. HIGGS

Faculty of Archaeology and Anthropology, University of Cambridge



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3. PREHISTORIC ECONOMIES: A TERRITORIAL APPROACH

E. S. HIGGS AND C. VITA-FINZI

The study of prehistoric economies has long been recognized as an important aspect of archaeology. Nilsson's classification of prehistoric man, which he put forward in 1873 and which can be traced back in essence to the abstract speculation of classical times, was based largely on modes of existence. He postulated four stages in human development: a hunter-gatherer stage, a herdsman or nomad stage, an agricultural stage, and finally civilization. In 1877 Morgan stressed that, while the Three Age system was extremely useful in the classification of ancient art, 'the great epochs of human progress have been identified more or less directly with the enlargement of the course of subsistence'. Since then, apart from Clark's important volume in 1952, we have made little progress beyond elaborating on the classic view that all men were hunters until the domestication of plants and animals opened the way to pastoralism and arable agriculture. In spite of Clark's admonition that many archaeologists were too artefactually orientated, the field has continued to be dominated by the consideration of artefactual styles and their chronology, and economic concepts have usually served for little more than the classification of cultures into 'hunter-gatherers', 'pastoralists', or 'farmers'. Yet each of these general terms covers a variety of forms of prehistoric economies and human behaviour, which it is the business of archaeology to attempt to understand.

There is evidently scope for an alternative approach in which prehistoric economies, and hence resources and their exploitation, are given prominence from the outset. Moreover, the time is ripe for such a re-orientation in prehistoric studies. The growing interest in modern subsistence economies and associated ecological problems makes it feasible to attempt a more refined analysis of their early counterparts, and also calls for further information on human response to changing environments, on man's contribution to these changes in the past, and on the relationship of human activities to particular factors in the biotope. Ethology is another constant source of inspiration, and it too is lacking in case studies which refer to the distant past or which encompass extensive periods of behavioural change. A third potential source of palaeoeconomic data is the student of organic evolution who wishes to go beyond the psychic factor in the development of mankind to an understanding of how and when somatic changes were supplemented or

even supplanted by adaptations of a more devious character.

But it is not enough to shift the emphasis to economy: new techniques are required to ensure that the information latent in the archaeological record is made available for analysis. Hitherto the prehistorian has tended to borrow from other disciplines rather than forge new methods for himself. The typological framework encouraged the view that successive peoples or tribes played out their lives against the background of nature, and the climatic and vegetational zones of the natural scientist provided a ready-made framework into which stylistic entities could be made to fit. Some studies conducted along these lines have undoubtedly proved illuminating and are capable of further elaboration, but there are drawbacks. The chief of these stems from the fact that the populations or attributes that define a particular climatic or vegetational zone do not necessarily impinge on human activities within it, while, if they do, it does not follow that a change in zonal properties will meet with a corresponding change in response. What is more, economic units are primary flexible artefacts, which are rarely confined to single environmental zones and are more likely to draw on the economically complementary resources of a number of different zones. To base the analysis of prehistoric sites on the methodology of the natural sciences is to disregard these difficulties, and could obscure the true relationships that existed between human activities and their environments. An alternative approach based on agricultural or economic zones may be more relevant to our purpose.

More recently there have been attempts to introduce the methods of quantitative geography, notably location analysis, into the subject. It would be a pity, however, if archaeology discarded what is perhaps its most precious resource — time perspective — in favour of a static view of spatial relationships, a drawback also inherent in the unguarded use of ethnographic parallels.

SITE DATA AND ENVIRONMENT: CATCHMENT ANALYSIS

As a first step it might pay to relate the evidence obtained from a site, and in particular its organic remains, to the area 'served' by that site. We shall define a site as a place where

there is a deposit or set of deposits which contain evidence of human activity. Clearly there will be other kinds of sites — rock fissures, caves, river gravels — which show no trace of human activity and still yield evidence relating to the environment. In either case a rewarding first step might be to relate the site record to the area served by the site. We believe that the methods proposed here may be applied with profit to non-archaeological as well as archaeological sites, and to species other than man. Human interests, and therefore archaeological sites, are given a first priority for the purposes of this volume; a broader ecological approach would obviously require that both kinds of site be considered.

An important characteristic of the constituents of a site is that they have been brought together by a variety of different agencies; this applies to inorganic as well as organic remains. The area from which a stream draws its water is termed its catchment, and we have extended this term to other physical and chemical agents of deposition, such as wind and ground water, and to the organisms that have contributed to the site's deposits.

Catchments will differ in shape and size from agent to agent. A collection of rodent bones brought to a site by owls will have come from a territory of about 12 hectares in extent somewhere within 10 km of the site; a collection of bones brought to a site by hunter-gatherers will probably be derived from a territory of about 30 000 hectares. The record will be further complicated where two or more agents of transport have intervened. Wind deposits may be redeposited by water; water-worn pebbles may be carried into a cave by flint knappers.

Even in the most general terms it is misleading to associate an archaeological site with a single uniform environment. Sites are commonly located at the junction of very different habitats, the integration of whose resources results in a viable economy. It could be argued that sites that have been occupied are *ipso facto* anomalous. They are preferred locations atypical of the zone in which they are situated. An oasis, for example, has water; a cave has less extreme temperature regimes than its environs. Thus the site record will be a biased as well as a partial sample. The technique of catchment analysis (Vita-Finzi & Higgs, 1970) has a dual purpose: to make the most of the sample, and to provide a critical basis for the drawing of generalizations from several such samples. The generalizations thus arrived at will be helpful in planning further excavation, whether by pointing to major gaps in the evidence or by furnishing a hypothesis in need of testing.

ECONOMY

The technology that prevails will determine the range of resources which can be exploited, and will thus affect the shape and size of the economic catchment or territory of

the site. In time the range and character of exploitation will be modified. Consequent upon technological change there was an increase in sedentary economies, perhaps the greatest known change in human affairs and one which led to civilization. It is therefore helpful to divide prehistoric economies into two broad classes, mobile economies and sedentary economies; the need for a third, mobile-cum-sedentary class will emerge later. These classes will not cover all possible situations, but they provide a useful basis on which to work.

MOBILE ECONOMIES

Mobile economies are practised by groups which move from place to place in the course of the year. In the archaeological record it is possible to observe such mobile economies as those practised by eclectic and specialist hunters; and from the ethnological record it is also possible to observe herders, herd followers, such as the Lapps, and pastoralists. The consequences of a mobile way of life, such as the relative scarcity of accumulations of durable wealth, that is durable beyond the lifetime of its creator, are so far-reaching in their social and economic implications that it seems reasonable to include these subdivisions in one class, that of mobile economies, rather than to include pastoralists in a farming category which includes sedentary exploitations. No mobile economy appears to have led on to a civilization. In a mobile economy the length of time a human group can stay at one place is ultimately determined by the amount of the least available necessary resource. This limit may be modified by social customs, food preferences, and the like, but such buffers against over-exploitation are in turn limited in their scope by the resources to hand. In due course movement will take place. In the long run the effect of movement — if successful — will be to coordinate resources, which from the viewpoint of the human group are ill-distributed, into successful economies and to maintain a higher population than could be supported if the resources were being exploited in isolation by specialized groups. Bird migrations, which serve much the same purpose, have been classified into regular (seasonal) and occasional; prehistoric subsistence economies may benefit from being studied in similar terms.

Recent studies of existing mobile economies have stressed that as with many animal populations numbers are often smaller than those which the available resources could support, being kept at that level by both well known social and less well understood physiological protective feed-back mechanisms (Wynne-Edwards, 1962). Yet in the long term a population is unlikely to be so closely adjusted to resources that it will never enjoy periods of scarcity and plenty, and there also are many ethnographic parallels

which illustrate this. Viewed graphically the fluctuating curves of available resources and human numbers will at times converge and at others diverge. The fact that the 'curves' interact increases the likelihood of conflicting trends. Thus population is likely to go on increasing after a resource peak has been attained; conversely, physiological and inflexible social brakes on increase may go on being applied beyond a resource trough. The present-day situation, where hunter-gatherer populations are well within the available resources, could well be a short-term effect of this kind which has been heightened by a population decline fostered by external factors such as the disruption of exploitation patterns at their periphery by the intrusion of differently based economies.

The wide variety of plants and animals eaten by hunter-gatherer groups, and the skill with which they exploit their environments, has also been stressed. The eclectic character of the foods exploited is not likely to survive intact into the archaeological record. Yet this need not rank as a liability. Thomson (1939) saw the need for dividing available foods into staples and casual foods such as medicines, relishes, and aphrodisiacs. When studying prehistoric societies it may be wiser and more practical to concentrate on staple foods even when casual resources are documented, since the former were the principal concern of the population and of greatest significance in the choice of those sites with an economic function and in the formation of exploitation patterns.

With mobile economies we face the difficulty that even though a single group may well have occupied several sites at any one time, we have no means of telling which sites were in fact precisely contemporaneous. This problem is an archaeological commonplace, for even in the study of artefactually defined stylistic groups we have to accept the device of considering them as archaeologically rather than absolutely contemporaneous. It is possible, however, to make the working hypothesis that, even though the great majority of sites which existed will have been lost or are unknown to us, sufficient may be known to indicate long-term trends in site location. That this can be so is indicated by differences in the distribution and location of say Upper Palaeolithic and tell sites. We believe that with careful study observations of this kind can be greatly extended.

Other assumptions may need to be jettisoned. Analysis of a site's territory may show that its resource potential is inadequate to explain its location or perhaps its very existence; the search for non-economic factors can then be given its head. On the other hand, it may be found that a site originally regarded as part of a mobile or mobile-cum-sedentary system is sufficiently endowed with resources to have supported permanent occupation. Even this, however, does not preclude the possibility of seasonal movement. It

allows the possibility of sedentary occupation to be entertained and makes sedentism the more probable of the available hypotheses.

SEDENTARY ECONOMIES

Sedentary economies are practised by human groups which stay in one place all the year round. They are marked by the development of durable wealth in the form of houses, buildings, roads and the like. The archaeological data does not always enable us to distinguish in marginal cases between mobile and sedentary economies, but it is misleading to assume that sites were occupied by a sedentary population unless there is positive evidence to the contrary. The study of site territories can help in deciding which hypothesis should be preferred. Some sites, such as Kastritsa in Greece (Higgs *et al.*, 1967) or the Mesolithic upland sites of Britain in the Boreal period, are clearly not likely candidates for year-round occupation; others, such as Sheikh Ali in Palestine, would have been most favourably placed for permanent occupation given an agricultural technology. On the other hand, the presence of houses or house foundations, even at tell sites, does not necessarily indicate that the occupants were sedentary, for the building of stone houses by mobile groups is well documented in the archaeological and anthropological literature.

MOBILE-CUM-SEDENTARY ECONOMIES

Mobile-cum-sedentary occupations are those where there is a mobile element associated with sedentary occupation. These economies are commonly found in lowland areas which lie adjacent to uplands. They are sites which take advantage of both the upland and lowland regions, the former commonly providing the animal protein and the latter the staple cereal crops. It is perhaps significant that frequently the larger tells, such as Megiddo and Jericho in Palestine, occupy sites of this kind. Another example is where a rainy season allows an expansion of exploitation into otherwise arid areas.

TERRITORY

The concept of territory is relevant to the present case. Naturalists have found it helpful in analysing aspects of animal behaviour which involve problems analogous to those facing the prehistorian. Although the concept of territory was not used in archaeology until 1967 (Higgs & Vita-Finzi, 1967), Carr-Saunders had applied it to man in *The Population Problem* in 1922 after Eliot Howard (1920) had given prominence to the discussion of bird territories.

Carr-Saunders suggested that human groups were without exception territorial in behaviour. This view has subsequently met with a measure of criticism.

In part the debate is about the word territory itself. The observation that many mammals kept to a particular area for the greater part of their lives had early led to the concepts of 'home range' and 'home region'. In 1939 Nobis defined territory as a defended area, and Burt (1943) drew a distinction between the home range — the area traversed by an individual in the course of food gathering, mating, and caring for his young — and the defended territory. Later work has blurred this distinction, it now being clear that an area which is habitually occupied is sometimes defended and sometimes not.

In an archaeological context it seems advisable to define territory as an area which is habitually exploited. That the concept is applicable to mobile as well as sedentary economies was clear to Carr-Saunders, who believed that unrestricted nomadism had never been practised by human groups. In classifying the pattern of life in western North America, Jennings (1957) wrote: 'The small groups moved regularly from place to place, from valley to upland, in search of the seasonal animal or plant resources which centuries of experience had taught them were to be had. The wandering was not aimless; it was based on intimate and annually renewed knowledge of a relatively well-defined territory.' This may be compared with the assertion that before agriculture 'small wandering bands of people ... led an essentially "natural" catch-as-catch-can existence' (Braidwood & Howe, 1960). The evidence available on both human and animal behaviour indicates that the 'natural' situation is rarely random, and that in order to understand this behaviour, we must assume the sort of patterning provided by economic territoriality.

The study of animal territories shows that there are occasional forays outside the 'lifetime territory' (Jewell, 1966a). We have defined a *site territory* as the area habitually exploited from a single site. The site catchment, on the other hand, embraces the terrain covered by occasional forays in search of raw materials for tools and other purposes. Yet it does not follow that all kinds of sites call for identical treatment: American 'kill' sites, for example, are not necessarily associated with exploitation territories. One may therefore distinguish between preferred sites — the 'home bases' of Flannery (Hole & Flannery, 1967) and Higgs and Vita-Finzi (Higgs *et al.*, 1967) — and 'transit', 'transitory', or occasional sites which bear evidence of only brief occupation. It may well turn out that a preferred site served as a home base for the exploitation of its environs, but this can be decided only after the analysis of the site territory. These analyses may also help to explain why sites such as Laugerie-Haute, Parpalló, and La Ferrassie, were

selected for repeated occupation over long periods of time, while others apparently in similarly advantageous situations were only rarely occupied.

The *extended site territory* (Sturdy, III. 5) may sometimes need to be considered. An extended territory is one where an area beyond the periphery of the site territory is habitually exploited. It will occur in circumstances where the distance factor does not apply. Sturdy points out the value of the natural corral in the exploitation of reindeer. Similar situations occur for example in New Guinea, where pigs are kept at some distance from the village in areas bordered by natural barriers from which they cannot escape, and also in other places where domesticated mountain sheep, tied by their behaviour to a small individual territory, need no containing fence or herder to restrict their movements.

Mobile groups commonly occupy more than one site during the year. There are many present-day and recent instances of this response to seasonal and geographical inequality, and it is not unreasonable to postulate that prehistoric peoples responded in a similar manner. Transhumance — both in animals and in peoples who exploit them — is an effective means of combining the resources of upland and lowland in a Mediterranean climate, or those of land and sea in many climatic settings. The resulting '*annual territory*' (Vita-Finzi & Higgs, 1970) may be found to embrace sites formerly ascribed on the basis of their artefacts to two or more cultural entities. By the methods we propose, the typologist will have additional evidence on which to decide whether or not in such circumstances a single human group or two or more human groups were involved. Where a mobile group occupies over the year a number of sites within its annual territory, it is not to be expected that different functions will be carried out in similar proportions at different sites, and indeed such differences may be expected to reflect in the proportions of the different artefacts present.

THE FACTOR OF DISTANCE

At a given technological level some resources will lie at too great a distance from a site to be exploited from that site. Lee's (1969) studies of the !Kung bushmen are a useful guide to the radius that limits the range of a mobile economy. Input-output analysis showed that the threshold was reached at a distance of about 10 km from the site. Von Thünen's classic studies of the 'isolated state' in which he suggested a hypothetical ideal system of land use as a model by which he could examine the effects of variables in order to observe how they modified the ideal pattern of land use, already indicated the importance of such thresholds in sedentary agricultural economies. The work of

PREHISTORIC ECONOMIES: A TERRITORIAL APPROACH

Chisholm (1968) on modern subsistence agriculture suggests that a decline in net return becomes significant at a distance of 1 km from the site and oppressive at 3-4 km (Fig. 1). While there are numerous historical and ethnographic instances of this oppression being surmounted, the general tendency would seem a suitable basis on which to form a workable hypothesis; hence our adoption of a radius of 5 km for the analysis of sedentary exploitation territories and of 10 km for mobile economies. As we show later, the actual delineation of the territories is more realistically based on time.

The effect of distance being cumulative, the resources

within the territory have to be weighted according to their position. For the sake of simplicity the terrain bounded by successive rings spaced 1 km apart can be regarded as uniform. The result of weighting is illustrated in Table 1; the factor employed was based in part on the figures given by Virri (Chisholm, 1968) for production per hectare at increasing distance from farms in Finland. A further refinement would be to convert land categories to their maximum calorie yield or to nutritional units. Webley (II, 6) illustrates some of the possibilities still to be explored in evaluating soil distributions within territories. One can also envisage the introduction of a measure to express

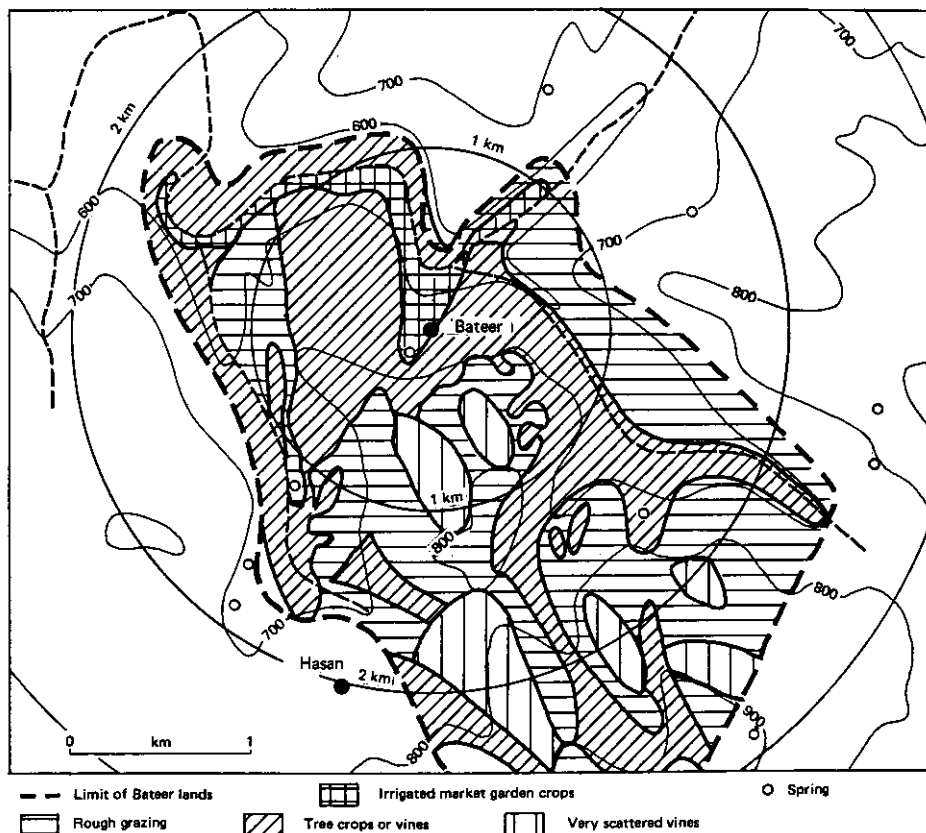


Fig. 1. A modern Arab village, Palestine.

Table 1. Unweighted and weighted land use classification around the Neolithic site of Megiddo (method of weighting as described in Vita-Finzi & Higgs, 1970)

	Land classification (percentage)					
	Marsh		Rough grazing		Arabic	
	Unweighted	Weighted	Unweighted	Weighted	Unweighted	Weighted
1 km	—	—	38.2	38.2	61.9	61.9
2 km	—	—	57.4	28.7	42.6	21.3
3 km	1.9	0.6	40.3	13.4	57.8	19.3
4 km	14.4	3.6	37.2	9.3	48.4	12.1
5 km	18.5	3.7	26.4	5.3	55.1	11.0

how far the territory departs from the ideal of circularity (cf. Bunge, 1966).

FIELD METHODS

It is a wise precaution to confirm that the proposed scheme is locally tenable by subjecting a modern subsistence site to catchment analysis. At Nahal Oren, where prehistoric sites

were being investigated, their present-day counterpart yielded the pattern shown in Figure 2. Note that distortion is introduced by factors other than those immediately obvious from terrain investigation, namely by lack of water to the north-west and by the intrusion of a neighbouring territory to the south. Nonetheless the result inspires some confidence in the method. A sedentary pastoralist economy may be expected to have a territory which approaches in size that of other sedentary site territories.

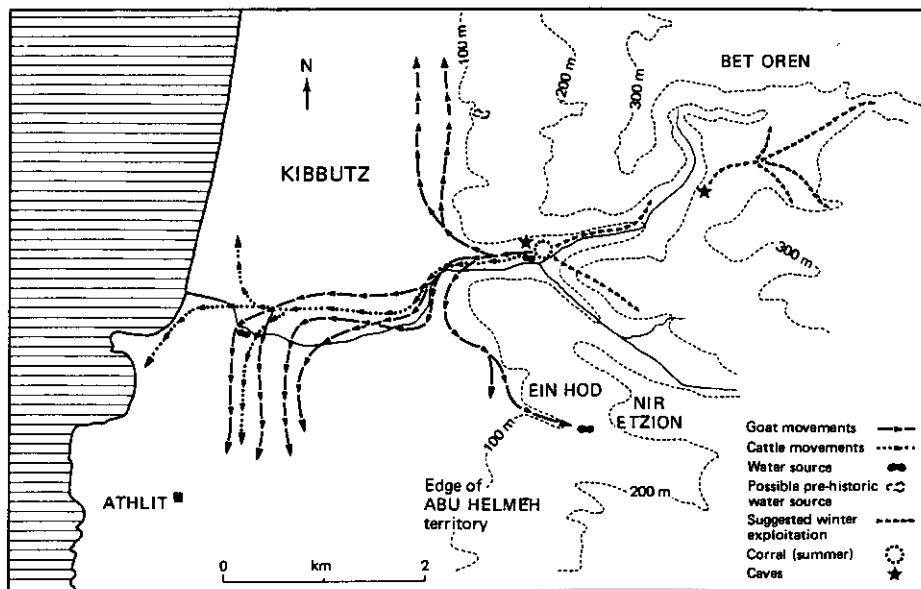


Fig. 2. Modern Arab sedentary pastoral exploitation from the Nahal Oren Cave.

As Chisholm points out, distance needs to be translated into the time taken to cover it. A walking distance of 1 hr is a workable basis for drawing the boundaries of agricultural territories and one of 2 hr for hunter-gatherer territories, since under optimum conditions the resulting areas come close to the 5 and 10 km circles proposed earlier. Broken or difficult terrain will evidently distort the shape of the territory so that in practice the ideal circular territory rarely occurs (Fig. 3). It is worth noting that von Thünen based some of his calculations on the speed of horsedrawn carts; but wheeled transport appears to have had little effect on the limiting distance. Four walked radii will commonly suffice for the operation, but more may be needed in hilly country. Since their measurement can be combined with

resource evaluation they are a sound investment. Excessive overlap between adjoining territories may invite a reduction in the adopted radius, but it is usually advisable to delay such adjustments until the nature of the economy is better understood since the areas of 'conflict' (like those of 'neglect') may emerge as having a significance of their own.

PHYSIOGRAPHIC CHANGES IN TERRITORY OVER TIME

At some sites geological changes during or since the period of occupation may have altered the character of the successive exploitation territories, either by the addition, transport, or removal of soils and deposits. In exceptional

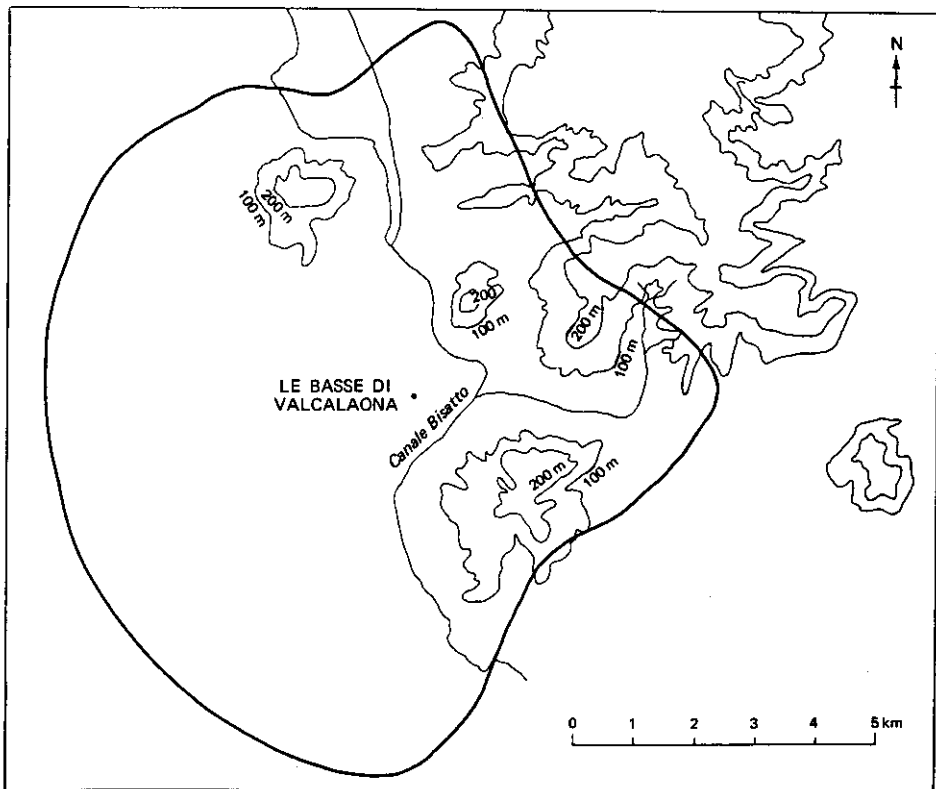


Fig. 3. Le Basse di Valcalaona, northern Italian Neolithic. Territory distorted by topography.

Were fishing populations under discussion it would be possible to introduce into the map the seasonal pattern of marine resources.

While we have tended to play down the role of palaeoclimatology in catchment analysis in favour of more immediate environmental controls, there cannot be any doubt that certain limiting conditions not now manifested may be found to have applied in the past. The distribution of snowline indicators such as cirques may show that the winter snow cover during the last glaciation was more extensive than at present and that it excluded parts of a site catchment from exploitation during that season. In our experience pollen analysis cannot serve in establishing limits of this kind, since any pollen sequence draws on a wide variety of catchments; but it is of course a valuable adjunct to other indicators of local conditions.

LAND QUALITY

So far we have considered land only in terms of total area. Some measure of its quality is needed if comparisons between catchments are to have any meaning. It is difficult enough to make a map of land potential in terms of the modern soil and of current technological resources; the problems are compounded when soil properties, plant and animal breeds, and land-use methods have to be inferred. The ideal would be to reduce the maximum yields attainable by the available soils to some measure of nutritional value (Stamp, 1958). Until more is known about ancient yields and carrying capacity, however, we have to be content with a more primitive assessment; but this has the benefit of speed and of low 'operator variance' (in that field mapping by workers with a variety of backgrounds gives broadly consistent results).

Figure 4 shows the catchment of the sites of Wadi el Mughara, which were occupied repeatedly from Middle Palaeolithic to Medieval times, broken down into the following categories: seasonal marsh, sand dunes, arable, potentially arable/good grazing, and rough grazing. While clearly open to refinement, this classification embodies certain useful principles.

(1) Land-use categories are employed only where neither environmental nor technological change are likely to call for their alteration for different stages during human occupation, or at any rate where such changes can be allowed for without the need for re-survey. Thus arable could serve as grazing land, but the converse is unlikely; rough grazing indicates a thin or patchy soil which if anything will have been further impoverished by the progress of erosion, but which does not justify the hypothesis that it represents

former arable land which has been eroded or depleted during occupation. Note that the intermediate category of arable/grazing is available for areas where there is room for doubt, and that the territory it embraces can be summed with either the arable or the grazing class when the maximum possible extent of one of these is being investigated.

(2) Terrain which is susceptible to drastic changes in value as a result of technical advances or human enterprise is given the most informative physical epithet. 'Marsh', for example, denotes areas for which there is either pedological or historical evidence of swampy conditions. Once it is ascertained what were or are the factors controlling this situation, it is possible to allow for their modification when obtaining totals for different stages in the past, once again without renewed mapping. In Palestine, for example, the coastal marshes will represent a contribution to the grazing total (with a marked seasonal significance) until modern times, when they become part of the arable category.

(3) Bare rock and the like are classified separately as unproductive since we are concerned with biological productivity; if mineral exploitation is at issue, the original survey can be oriented so as to specify the rocks represented within the catchment.

(4) A miscellaneous category (here represented by 'dunes') acts as safety valve for the field surveyor; the interpreter can then pass judgement.

Within these major categories there is scope for subdivision. In subsequent surveys of agricultural sites, for example, arable land was mapped according to its texture, it being argued that of the numerous soil properties that affect yields this factor was likely to have been least modified by cultivation. The value of distinguishing between light and heavy soils will be apparent to students of early agriculture or of Roman agronomical literature.

CONCLUSION

We have seen that prehistoric economies can be classified as to whether they were mobile, sedentary, or mobile-cum-sedentary. The concept of economic territoriality allows us to delimit the habitually exploited area around a site from which any of the above types of economy was practised. Through the use of the technique of site catchment analysis and an assessment of past and present economic potential of the site territory, we may make a start in the study of man's changing relationship with his environment through time. The methods outlined here are capable of considerable refinement and elaboration, but the results already obtained suggest that further research along these lines will prove fruitful.