

LAND CONSOLIDATION AND FRAGMENTATION:

AN EVALUATIVE CASE STUDY

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PREFACE AND ACKNOWLEDGEMENTS

This thesis is the result of three years of research supported by an SSRC Linked Award Postgraduate Studentship in Land Reform Studies supervised by Russell King. My first acknowledgement must go to Russell King whose expertise in the field of land reform (King, 1971; 1973; 1977) and first-hand experience of the Cypriot land consolidation situation (King, 1980a) led to the original conception of this study. My second acknowledgement is to the Social Science Research Council for their support over the three years 1979 - 1982 and for their all-important supplementary funding for library visits to London, Reading and Rome and for fieldwork in Cyprus.

Starting as a postgraduate student new to work on land reform, I found many of the ideas and concepts surrounding land fragmentation and consolidation initially unfamiliar. However, as time passed, I became gripped by the enormity of the land fragmentation problem and stimulated by the achievements of many of the official land consolidation programmes in various parts of the world. Moreover, I became convinced that the geographical aspects of the fragmentation/consolidation theme were generally neglected, although these were live issues for many millions of peasant farmers throughout the world. Here was a challenge: on the one hand to make geographers and others more aware of the significance of land fragmentation and consolidation in rural development and, secondly, to develop a methodology for investigating the geographical nature and spatial impact of the land consolidation process.

Work on this study began in October 1979 at the Geography Department of the University of Leicester, starting with a literature search. During the early weeks of research a wide and divergent literature field was consulted. The following reference tools proved indispensable: FAO's 'Bibliography on Land Tenure' (1972); the six-monthly bibliographic supplements to FAO's bulletin 'Land Reform, Land Settlement and Co-operatives'; WAERSA (World Agricultural Economics and Rural Sociology Abstracts) and, more familiar to geographer bibliophiles, 'Geo-Abstracts'. By December 1979 the results of this labour saw the writing of a lengthy literature review which, after considerable modification, was to become the basis for the first two chapters of this thesis. At this time it also became apparent to me that there were many difficulties associated with the consolidation process. These 'problem areas' were eventually to become the focus of my research although the country of study, at this stage, was still uncertain. Prominent in offering

help and advice during this period of exploration were Ian Bowler and Tony Budd of the Geography Department at Leicester.

Early in 1980 Cyprus was selected as the most suitable study area and preparation for fieldwork began in earnest: available literature on Cyprus, particularly on the land tenure situation, was sought out and collected; advice on fieldwork was obtained from L.S.E. anthropologist Peter Loizos who had considerable experience of research in Cyprus (Loizos, 1975); lessons in Greek were undertaken at the Linguaphone Institute in London. The search for relevant literature continued with a fruitful two-week visit to FAO in Rome. Here library work was combined with a series of interviews and discussions with Demetrios Christodoulou, senior officer in the Human Resources and Agrarian Reform Division of FAO. A Cypriot and a geographer, Christodoulou had himself played a pioneering role both in the study of land tenure in Cyprus (Christodoulou, 1959) and in the early moves to get a land consolidation law off the ground. His advice contributed considerably to the eventual structure of my research project.

In May and June 1980 a six-week pilot visit was made to Cyprus in order to work out the practicalities of a much longer period of fieldwork. During this first glimpse of the Cypriot countryside and its peoples, I owe much to the help of John Chrysouliotis and his family who made me welcome in their home and instilled in me a love of the country and its inhabitants. At the Land Consolidation Authority in Nicosia George Karouzis helped with my initial queries and arranged various visits to consolidation schemes.

I returned to England in June and began immediately to prepare for another visit to Cyprus in October. Most of this time was spent developing the interview schedule, planning the fieldwork and making travel and accommodation arrangements. The questionnaire evolved only slowly; advice from Ian Bowler and Russell King eased the painful process.

Autumn saw a return to Cyprus and the beginning of a ten-month period of research. During this stage much valuable help and advice was given by the following members of the Land Consolidation Authority: George Karouzis, Nicos Georgiades, Frosoula Christofidou, George Mavrommatis, Telemachos Clerides, Vasos Constantinou and Andreas Papageorgiou. Other Cypriots were also supportive during this time, particularly Marios and Georgia Solomonides, Christos Chrysoulitis and Alecos Georghiou. Reeling off this list of names reminds me to warn the reader that there is no hard and fast rule on the rendering of Greek words into English. This is especially notable where place-names are concerned, with some village names having as

many as six alternative spellings (Goodwin, 1976). A note must also be made on the Cypriot currency since there is a large body of information presented in the thesis in this form. The Cyprus pound (£CY) has a rather higher value than the pound sterling, in 1981 being equivalent to approximately £1.30.

In August 1981 I returned to England and began the difficult task of sorting and analysing all the information I had collected. During the first few months of that autumn term my time was spent working at a computer terminal. When problems arose David Unwin and Alan Strachan of the Geography Department at the University of Leicester came to my assistance. At the end of this period of data analysis I began to plan out and write drafts for each of the chapters of this thesis. At this stage Russell King devoted much of his time to reading through and commenting on each chapter in turn. With his considerable editing experience he offered invaluable help. The final chapters were completed in the spring of 1983.

It is also a pleasure to acknowledge the help of Ruth Rowell and Kate Moore of the Cartographic Section of the Leicester Geography Department. They drew some of the maps and gave sound practical advice on others that I drew myself.

Some parts of this thesis have already appeared in print. Parts of Chapters 1 and 2 form sections of a series of joint papers with my supervisor (King & Burton, 1981; 1982; 1983), parts of Chapter 3 have appeared in another joint paper (Burton & King, 1982) and Chapter 5 has been published as a Leicester University Geography Department Occasional Paper (Burton, 1983).

On a final note, I would again like to thank Russell King for his encouragement, help and friendship during this period of work.

STEVE BURTON

Election Day, June 9th, 1983.

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CHAPTER ONE

THE GEOGRAPHY OF LAND FRAGMENTATION AND CONSOLIDATION

An important theme in rural geography is the agricultural landscape, of which farm structure is an integral part. Some elements of the agricultural landscape, such as the geographical distribution of farmsteads and the pattern of walls, hedges or fences delimiting the fields, are visible. Other elements are not. One of these 'invisible' elements is the farm structure - the groupings of fields owned or worked by individual farmers at any point in time. This type of structure involves both the area and the spatial layout of the farm.

For a long time geographers and others have been interested in the areal aspects of land tenure and this has recently been identified as a field of growing interest within rural geography (Grigg, 1981, p. 271). It is true that land tenure, and its reform, are basically matters of a legal, political and economic nature, often evoking much rhetoric and ideological debate (King, 1977, Ch. 1), but there is one aspect of land tenure which is more centrally geographical since it refers directly to the spatial structure of farm holdings. This is land fragmentation, which poses serious problems for the modernization and development of farming.

The fragmentation of agricultural land is basically concerned with farms which are poorly organised in location and space. Consolidation, the name given to the policy response to poor spatial organization of farming, is therefore intrinsically a spatial problem-solving technique. However the fragmentation-consolidation theme has long been regarded as a side-issue to the more fundamental problem of inequitable land distribution and has only been given cursory treatment as a result (Jacoby, 1971, Ch. 8; King, 1977, pp. 19 - 22). The standard texts on agricultural geography mention fragmentation either not at all (the case of Tarrant, 1974), or only in passing, and then only to briefly outline its negative effects (Gregor, 1970, pp. 87 - 88; Morgan & Munton, 1971, p. 58; Symons, 1978, pp. 67 - 68). Only Clout (1972, pp. 102 - 112) has a somewhat more extended treatment, while Chisholm examines fragmentation within the well-established Thunian framework of distance from the farm (Chisholm, 1979, Chs. 3 & 6). Although land consolidation has been termed 'land reform on a micro-economic level' (Jacoby, 1968, p. 31) and 'the small land reform' (Jacoby, 1971, Ch. 8), it is an essential part of agrarian policy in many countries, particularly in Europe. Especially in relatively advanced countries, regions of fragmentation are often 'distressed areas' which have been bypassed by general economic development.

1.1. SOME DEFINITIONS

Before discussing fragmentation and consolidation in detail these terms must be defined. From the literature it emerges that the term fragmentation is used in two quite distinct senses. Firstly, it is often taken to imply the subdivision of farm property into undersized units which are too small for rational exploitation. Secondly, it can refer to the situation whereby an individual holding is split into many non-contiguous parcels. Some authors try to distinguish between the two forms by creating their own terminologies. Farmer (1960), for example, refers

to the first as subdivision and the second as scattering. French terminology uses morcellement for subdivision and parcellement for scattering or parcellization, but in practice morcellement is sometimes used indiscriminately for both cases. Sanderatne (1972) sees fragmentation as the process of division of existing holdings whilst parcellization is the state of spatial segregation of plots which are technically and economically part of one enterprise. The issue is further complicated by the fact that both types of fragmentation frequently co-exist, and by the fact that consolidation is the term applied to the remedy of both situations. The FAO defines land consolidation as a measure 'to create, or foster the creation of, individually-owned farms of adequate size, structure, capitalization and management' (Meliczek, 1973). This definition covers the enlargement of uneconomic holdings as well as the grouping of scattered plots. It also carries an ideological value - judgement on the desirability of individual ownership.

In the context of this research, fragmentation is taken to mean the spatial dispersion of a farmer's plots over a wide area, intermixed with parcels operated by other farmers, i.e. the second definition given above. Fragmentation in the first sense - undersized farms - constitutes a problem of wide-ranging implication, linked to issues of overpopulation, polarized land ownership and to processes of land redistribution as in a conventional land reform. Consolidation, on the other hand, is an attempt to eliminate land fragmentation through a process of spatial concentration, the ideal solution being the regrouping of a holding's scattered parcels into a single compact plot.

1.2. THE EXTENT OF FRAGMENTATION

The problem of fragmentation is present in most old peasant communities throughout the world but it would be mistake to regard it as purely an inheritance from earlier epochs or a relic feature of rural backwardness.

Fragmentation does not necessarily reflect the age of the agrarian system. There is a tendency sometimes for a 'self-healing' process to occur where fragmentation threatens to go too far. Enquiries into medieval village structure shows that fragmentation was initially rather modest. Even in Western Europe much of the fragmentation that now exists has evolved recently over relatively few generations. Dovring (1965, pp. 46 - 47) cites the case of parts of the Balkans, settled only in the nineteenth century, where fragmentation was already severe by the early twentieth century. He also stresses the speed with which many newly-consolidated areas re-fragment within a few decades: the experiences of the early twentieth century schemes in Austria and Germany, many of which have had to be re-consolidated, are instructive here (Lambert, 1963, pp. 37, 43). American experience also contradicts the view of fragmentation as a feature characteristic only of backward agriculture. Smith (1975) has shown that in the United States some of the largest and most successful farms have a fragmented structure; dynamic expanding farms cannot find land near at hand and so purchase or rent parcels often at some considerable distance from the farm headquarters; rapid transport and the large size of fields lessen the inefficiency of this fragmented structure. An historical analysis of subdivision and fragmentation in Illinois by Salamon (1980) shows the rate of fragmentation to be related to the early Irish and German colonisers who practised partible inheritance and followed the ideal of all children becoming farmers.

The literature on farm structure is replete with examples of extreme fragmentation from many parts of the world and from many historical periods. Typical is Thorpe's (1951) study of an eighteenth century Danish open-field village. The pattern was one of miniscule fragmentation; one peasant held 127 strips, few of which were contiguous. Naylor (1959, p. 363) gives examples from early post-war Spain: a farmer in Zamora province with 66 acres divided into 384 parcels; and fragments of arable land so small as

to be impossible to turn a yoke of mules. A more recent study in Galicia showed the average number of parcels per farm to be 32; severe fragmentation prevents the population from extracting anything like full potential from a generally favourable physical environment (O'Flanagan, 1980). Even more extreme cases can be found. Guedes (1981, p. 27) notes the case of particularly favoured seed-beds in Spain which are often divided among inheritors to produce plots literally the size of a handkerchief.

Some countries have developed their own terminologies to describe fragmented landscapes. In Italy, for example, the occurrence of under-sized fragmented holdings is graphically termed polverizzazione (Lambert, 1963, p. 31). In Spain there are regional expressions such as "El Corro" (the middle) for an olive grove of six trees or less, "La Estampa" (the imprint) for a tiny plot hanging on a hillside, or "La Amelga", a small plot surrounded by other tiny fields (Guedes, 1981, p. 28). Sometimes the extent of fragmentation reaches physically indivisible proportions. In the Mediterranean region it is common to find that ownership of trees is distinct from that of the land on which they grow. Trees themselves may be subdivided, such as the separation of the rights to cut wood, gather fruit, or even to use the shade. In Sri Lanka Arulpragasam (1961) found two coconut trees shared by 360 people. Likewise undivided fractional shares of land may reach bizarre proportions such as the $2450/282,240,000$ ths (0.00000868) of a $\frac{1}{3}$ acre plot in Taiwan recorded by the Vander Meers (1968)!

Much rarer, but more important, are studies of average conditions over wider areas such as whole countries. On the widest possible scale, the World Census of Agriculture, taken in 1960, recorded that fragmentation was most severe in Europe (an average of 6.7 plots per holding), followed by Asia (4.0 plots per holding). According to Dovring (1965, pp. 39 - 40) about 35% of Europe's farmland was in need of consolidation in 1950.

By far the most detailed study of farm fragmentation is the analysis of Greek agriculture by Kenneth Thompson (1963). His study revealed a pervasive and chronic fragmentation of Greek farm holdings which provides an impossible framework for any thoroughgoing modernization or mechanization. Mean farm size was 3 hectares with an average of 6.5 plots. The region suffering most from the fragmentation was Crete with 9.0 plots per holding and a mean size of 2.6 ha. Many holdings on this island had twenty or more plots. For the whole country, mean plot distance from the farmhouse was 2.5 km, but many farmers had most of their plots located some 10 km away. The most extreme example noted in Thompson's field investigation was a holding of 15 ha. divided into 80 parcels. 'Truly', Thompson wrote, 'the fabric of Greek agriculture has been cut to pieces'.

In most European countries progress towards consolidation has been slow (Lambert, 1963) and the overall situation has not notably changed in recent decades. If anything it has worsened, for since 1950 the technical requirements for rational farm layout have become more stringent with the advent of machines and increased labour costs.

1.3. THE CAUSES OF FRAGMENTATION

Land fragmentation may be the result of several processes working either together or independently. These may be broadly grouped into four categories: socio-cultural, economic, physical and operational.

Socio-cultural processes, the first group, comprise a number of important elements leading to fragmentation. For example, a land tenure system based on tenancies is unlikely to lead to a successive reduction in farm size or an increase in fragmentation of holdings unless the landowner can make a greater net profit from the rents of several small pieces of land than from a single large one. However, the owner-occupier can divide his holding as he pleases. Particularly important under this tenure form are the inheritance laws of partible inheritance which demand equal division

of land amongst heirs, rather than primogeniture where the eldest son or child receives all. The principle of partible inheritance has deep historical routes in Old World countries. For example, both the Napoleonic Code, with its provisions for equal sharing and compulsory portions, and the Islamic inheritance laws, requiring equal distribution of the patrimony of land upon the land holder's death, have been the basis of much land fragmentation. In Germany the adoption of the 'Gavelkind' - a system of land tenure whose chief feature was the equal distribution of land amongst the heirs of the land holder - led to excessive fragmentation (Mayhew, 1970).

Fragmentation is exacerbated where heirs are able to demand equal shares of different types of land such as orchard, pasture and irrigated field. A farm of say, three plots with different land qualities or uses would therefore be split into twelve fragments if there were four heirs. Zaheer (1975) has pointed out that extreme fragmentation in India occurs mainly where there is considerable local spatial variation in land quality. Where land is under valuable perennial crops or is irrigated an exact division of each plot is often insisted upon. In Greece perennial crop land is fragmented at a faster rate and to a greater extent than arable and pasture (Thompson, 1963, p. 24).

Once the process of fragmentation has started, it continues with geometrical progression at each succeeding generation. Equal inheritance by women with men tends to periodically check (upon marriage) the diminution in the size of holdings but increases the degree of fragmentation.

However, the existing state of fragmentation cannot be ascribed solely to the inheritance rules. The high degree of fragmentation which existed in the congested parts of western Ireland, for example, arose in spite of the English laws of primogeniture.

Land may also be fragmented by small plots being gifted to individuals as dowries or building plots or to charitable or religious organizations. Moneylenders may collect parcels of land in lieu of debt payments and thereby acquire spatially dispersed holdings.

All these influences are likely to be strengthened by the driving force of demographic growth, particularly where alternative sources of employment are lacking. For the Netherlands Vanderpole (1963) has pointed out that fragmentation is worst in the South-east where Catholicism has a stronghold and families are larger than in the rest of the country.

Secondly, economic processes may lead to fragmentation. It may happen that a pattern of fragmented holdings which at one time was rational is subsequently rendered irrational by changes in the economics or technology of farming. Often the earlier pattern remains fossilized on the modern landscape, such as the pattern of strips from an old open-field system. In Ireland small fragmented holdings created to meet the needs of peasant arable farming became unsatisfactory when the rural economy turned towards stock and dairy farming (Binns, 1950, p. 9). There are other economic pressures too. Often when a farmer wishes to buy or rent additional land he is prevented from doing so in an area contiguous to his own holding and so distant plots are taken. As the rural population increases fragmentation may be fostered by the process of letting land in smaller and smaller pieces in order to maximise income from tenants. Fragmentation may also result from the process of economic expansion when farmland, won piecemeal from the waste at times of food shortages or high land prices, is divided internally into small individual plots.

Thirdly, fragmentation may be underlain by physical factors. Broken, dissected topography may make the continuity of farmed space difficult. The form of the terrain and the nature of the agricultural enterprise may

make the spatial separation of farm plots unavoidable or essential - as for example with transhumance on Alpine farms. This example of economically rational fragmentation will be examined in more detail in a later section of this chapter.

Fragmentation may also result from man-made physical processes. Canal location in Turkey, for example, has been cited as a major cause of land fragmentation (Busch et al., 1979). In developed countries considerable effort has gone into documenting the loss of agricultural land through urbanization, industries and roads, but little is known of the problems of land fragmentation arising from these features. The fragmentation of city neighbourhoods by urban motorways has been recognized, but less so the fragmentation of rural land by motorways.

Fourthly, fragmentation may be the result of what might be termed 'operational processes'. Here separation may result from establishing a fence or ridge between plots or designating a specific area to a particular land use, as for example delimiting a conservation area. One of the major causes of fragmentation in Turkey is the 'operative process' whereby a government land distribution programme has fragmented village common land and allocated it in small parcels to members of the village community (Busch et al., 1979). It has also been noted that the land reforms in Italy resulted in the carving up of great estates often accentuating the very high degree of fragmentation (Lambert, 1963, p. 44). Similarly the Greek distribution of state and expropriated properties did not take the form of one parcel of land per beneficiary but saw 4 to 18 tiny plots of land going to each recipient. Such fragmented assignments were generally made as the result of the beneficiaries' myopic concern for equitable distribution of all land types (Thompson, 1963, p. 23).

Finally, mention must also be made of the link, which is associative

rather than causative, between agglomerated settlement and fragmentation. Although severe fragmentation can co-exist with dispersed settlement, as Tindituza and Kateete (1971) have shown for Uganda, farmers living in highly nucleated settlements are more likely to have fragmented holdings than those living in farmsteads on their land. Such a situation is not necessarily one of farmers' preference; in many areas of southern Italy and the Iberian peninsula, for instance, the historical development of the land tenure system, with a well-established feudal economy until relatively recently, has led to the concentration of rural population in nucleated 'agro-towns' which were a reflection of peasants' lack of access to permanently owned land, only to fragmented, short-contract parcels. Chisholm (1979, Ch. 3) has examples of this. Binns (1950, p. 11) has, however, pointed out that living away from the farm may reduce the negative psychological effects of fragmentation, since the inconvenience of scattered parcels is less obvious to a farmer who does not live on any part of his farm than to one who does.

1.4. THE DISADVANTAGES OF FRAGMENTATION

Most writers concerned with agrarian structure condemn fragmentation for its disadvantageous effects on farming, although detailed empirical analyses of these effects are relatively few. Here are three typical statements from different rural contexts. According to Sargent (1952) fragmentation is 'the greatest single factor limiting an increase in French farm production One half of the arable land in France is so severely cut up and fragmented that production costs are high and mechanization and rational land-use impossible. The problem posed by fragmentation exists in nearly every farm community in France'. In Spain the 'disease' of fragmentation 'produces no social benefits whatever, and at the same time precludes any rational and economic use of land (it is) the principal obstacle to the rationalization of Spanish agriculture' (Naylon, 1959). And in India 'fragmentation is a system of perpetual handicap retarding the agricultural economy' (Zaheer, 1975).

In the following account the disadvantages of fragmentation have been grouped under four broad headings: economic, social-psychological, ecological and political-administrative.

The first group – economic disadvantages – is usually seen as the most forceful argument against fragmentation. Farmers lose time travelling back and forth between scattered plots. Strictly speaking it is not time that matters from an economic point of view, but the value of that time, measured either as the wages paid to the workers or as opportunity cost in terms of production foregone. Chisholm (1979, p. 39) has assembled data from six African countries to show that between one tenth and one third of agricultural time is spent travelling to and fro. In Cyprus Karouzis (1971a) found that farmers in the backward region of Pitsilia (where there is an average of 22 plots per holding) travelled a mean distance of 2,444 miles per year to visit their scattered parcels. When covered on foot such travel makes up half the work time of farmers. In Greece one of Thompson's interviewees had just spent 5 hours travelling to perform a 15 minute spraying operation (Thompson, 1963, p. 205). Additional time and energy are also wasted because of the excessive amount of hand work which has to be done in the corners and along the borders of small parcels where machines cannot operate. Another economic drawback is the difficulty of using modern machinery in small irregularly shaped fragments; on a one hectare plot a tractor can spend up to a third of its time simply turning round (Naylon, 1959, p. 364). In a pastoral economy the spatial separation of fields prevents the efficient use of grazing grounds because of the difficulty of moving animals from one parcel to another without damaging intervening properties. Improvements to the land such as new fencing or the provision of irrigation facilities are often ruled out because of the high costs of fragmentation. Far-flung plots are difficult to supervise and their crops may be open to theft or damage by animals or humans. Finally, multiple rights of ownership create problems in implementing changes in land use and as a result farming methods may be unable

to change.

Secondly, there are social and psychological issues. Social tension is caused by disputes over access, rights of way and damage. Some of these problems have been well documented in Greece where property division amongst co-heirs is often marked by tension, mutual distrust and even violence, and where 47% of plots and 33% of farmland are only accessible by trespass on someone else's land (Herzfield, 1980; Levy, 1956; Papageorgiou, 1956; Thompson, 1963). Litigation over such matters may be protracted and expensive. Problems of human and animal congestion and of hygiene occur in farm dwellings crowded into the nucleated villages often associated with land fragmentation. Where fragmentation involves the progressive creation of holdings that are too small, unemployment and underemployment can result. All these conditions, when combined with the physical debilitation of the farmer resulting from the energy lost in travelling to scattered plots, can have a damaging psychological impact. Such problems are rarely discussed in the literature but it is clear that this psychological effect can depress the spirit of the farmer who may end up abandoning his land altogether and leaving for the city.

Land fragmentation may also result in ecological disadvantages. These arise from the problems of soil conservation and irrigation when a farmer's land is widely scattered. Soil improvement is often impossible and so the potential productivity of the land declines. In some cases peripheral land may be abandoned leading to a reduction in agricultural potential for the region as a whole. Irrigation control and rational crop rotation are difficult and costly to introduce and may be impossible for some fragments. Often there is a duplication of irrigation facilities resulting in the wastage of water. Moreover the confused pattern of plot ownership hinders attempts at implementing local or regional land improvement or conservation schemes.

Other disadvantages are more concerned with the administrative and political aspects of rural life. Fragmentation increases the number of people involved in implementing decisions about a particular area. Consensus becomes less likely and co-operation more difficult as the farmer is less and less committed to each parcel. Cadastral authorities have difficulty in identifying and monitoring precise patterns of ownership. This in turn affects land tax collection. Disputes over ownership and access clog up and waste time at the local courts. Farmers' unrest and anger over these issues may have political implications which, if the rural vote is large, could have national significance.

In conclusion it would appear from these arguments that land fragmentation commonly results in unfavourable conditions for the producer, for the government, and for the land itself. Economic disadvantages appear particularly marked: increased costs of production, lower yields per unit of land and of labour, indebtedness and loss of energy in the ecological system because of lack of and waste of inputs.

1.5. ADJUSTMENTS TO FRAGMENTATION

Although fragmentation is conventionally portrayed as a kind of structural straight-jacket on farming, farmers do make certain adjustments to reduce some of its iniquitous effects. One of the most obvious adjustments is intensity of cultivation - usually measured in terms of labour input - which tends to decline the further the parcel is located from the farmstead. This relationship is discussed in more detail in a later section. Another is the social mechanism of joint ownership. This allows the subdivision of title demanded by equity and inheritance customs but without the physical subdivision of the land, since the co-owners agree to farm it as one unit. Vander Meer (1975) gives several examples of this from Chulin, a village in Taiwan. He was able to show that the flexibility of co-ownership facilitated efficient farming of the land and also operated when land

was sold to other groups. In Chulin village in 1967 30% of farm households, 18% of cultivated plots and 12% of the land were involved in 'operational consolidation'. If shareholders had exercised their rights in each plot they would have worked in 157 places, but through joint ownership the operational number of plots became 60. Joint ownership is more flexible than individually fragmented ownership since it allows farmers to rearrange ownership units into more suitable operational units, thereby avoiding the deleterious effects of minute fragmentation. In practice, however, this type of adjustment is limited to intensive cultivated irrigated land found in many South-East Asian countries.

A rather similar practice, also well documented in South-East Asia (c.f. Agrawal (1971) for India, Ganawatte (1974) for Sri Lanka and Vander Meer (1975) for Taiwan) is that of renting out remote parcels to other farmers for whom they are more accessible. This can be compensated by the first farmer renting in other parcels which are closer to his farmhouse. In this way the pattern of operation becomes more compact and rational than the pattern of ownership (Chisholm, 1979, p. 59). Another response may be the selling of bulky crops in the field or at roadsides, so avoiding the cost of transporting the produce to the farmstead (Edwards, 1961). Pick-your-own farms are also a good example of this adaption.

Where farmers operate particularly remote plots, temporary secondary dwellings may be erected, to be occupied only when the farmer is working his plots in that area. Such dwellings are quite common in Alpine and transhumant agricultural systems. In Greece peasants with plots more than about 10 km distance from their village residence commonly 'camp out' in stone and brushwood shelters. The social isolation, discomfort and lack of amenities in these temporary dwellings are viewed with disfavour by those concerned (Thompson, 1963). Similar temporary shelters are used by Corsican and Sardinian shepherds on remote fragments of pasture (Houston,

1964). Ultimately, however, fragmentation may invoke permanent residential shifts. Brookfield (1973) found that New Guinea Chimbu re-locate their dwellings when the house-to-plot distance exceeds a certain threshold. In parts of southern Italy, where fragmentation is often acute, farmers have been transferring residence from interior villages to marine or coastal hamlets in order to be nearer their best parcels of land (Kish, 1953).

1.6. THE CASE FOR FRAGMENTATION

The arguments given earlier against fragmentation do not mean that it is a phenomenon always to be condemned. In certain circumstances fragmentation may be desirable or even necessary. It may, for example, be a perfectly logical and sound response to soil and crop variations or to spreading the risk of climatic or other hazards like frost, hail, flood or animal damage. Igbozurike (1970) claims that in the tropical realm the importance of fragmentation is greatly overrated. In this area, where people and societies have evolved agrarian practices over millenia, fragmentation has long been endemic and appears to be almost as ancient as the practice of tillage itself. Presumably, therefore, it has utility and relevance for its practitioners: otherwise, he argues, it would not have lasted so long. This section examines the case for fragmentation at two levels. Drawing firstly on micro-economics fragmentation is evaluated at a theoretical level. This is then followed by a review of empirical evidence much of which has been collected by ecological anthropologists.

1.6.1. An Economic Rationale for Fragmentation

The fact that owners with rights to fragmented land do not generally agree spontaneously to consolidate their holdings suggests that there may be some underlying economic rationale for fragmentation as well as the more commonly ascribed factors of tradition and cultural inertia. A paper by Johnson (1970) shows that from a theoretical standpoint fragmentation may be economically rational, provided certain conditions are present. These conditions are: spatial variations in land types; a predominantly subsistence

economy; low cost of transport; minimal use of capital intensive techniques; and a high cost of exchanging parcels of land. Two hypotheses are advanced. The first is that the greater the degree of subsistence (or the lower the degree of specialization - specialization being defined as a situation in which an individual produces more of a commodity than he consumes), the greater the degree of fragmentation individuals will prefer in an economy in which land is not homogeneous. The second hypothesis, which is somehow mis-stated by Johnson, argues that given a degree of specialization in final goods (and therefore some pressure for consolidation), the higher the cost of swapping land, the lower the cost of transport and the smaller the amount of equipment used in production, the greater will be the tendency for fragmented holdings to persist given initial fragmentation.

Johnson notes that the essence of a subsistence economy is that the cost of exchange is so high as to make specialization unprofitable. In a pure subsistence economy, starting from any composition of types of plots, individual farmers will seek equilibrium compositions of parcels such that their holdings have comparative advantage in the production of more than one agricultural homogeneous commodity. (If the land is homogeneous then comparative advantage deriving from the suitability of particular locations or soil types for particular crops disappears and pressures for consolidation accumulate). Since the comparative advantages of parcels are, in Johnson's model, postulated to differ (so that different compositions of parcels yield different equilibrium amounts of goods), any farmer will prefer a collection of parcels of more than one type in order to reduce the cost of attaining his necessary requirements. The farmer will therefore prefer a fragmented holding.

In an economy where there is some exchange of final goods, the extent to which individuals will seek to specialize will be influenced by the cost of exchange. The lower the cost of the exchange, the more farmers will

tend to specialize. Costs of exchange fall as markets for exchange develop and a widely accepted medium of exchange - money - becomes available. Specialization, exchange and consolidation interact. Increased specialization of production will lead to greater preferences for consolidated as apposed to fragmented holdings, since this implies a reduction in the number of commodities produced by any individual and therefore a reduction in the numbers and types of plots which have comparative advantage in producing specified crops.

Another important factor which Johnson introduces into his model is the notion of 'swapping cost'. In reality, the swapping cost of land is positive: the greater the swapping cost, then the greater the cost of moving to a preferred combination of land types and locations. Swapping cost is dependent upon the stage of development of the land market and the size of the land holding group. Where there exists a highly organized land market the cost of information concerning the relative values of exchange is reduced. In a subsistence economy such information is expensive and must be obtained through protracted bargaining and negotiation. The lower the cost of information, the lower the cost of swapping; and since swapping costs affect the magnitude of responses to consolidation, this is an important factor in maintaining fragmentation. The size of the land-holding group is an important cost factor in intra-group negotiations in land swapping. Costs increase with the size of the group and so where large groups, such as tribes, clans or extended families prevail, there will be a tendency towards greater fragmentation.

Finally, fragmentation will also tend to occur when transport costs are low. In most subsistence societies where heavy implements and materials are not important in an individual's production process, then the advantages to be gained from consolidation are lower than otherwise. Similarly, the lower the cost of transporting oneself, the smaller the gain to be made

from consolidation and the less incentive to shift from fragmentation.

1.6.2. Empirical Evidence of Rational Fragmentation

Most empirical accounts of the rationality of fragmentation originate from the work of ecological anthropologists and much of this work is set in Alpine environments where micro-variations in altitude, slope, soil, precipitation, temperature, wind, sunshine and shade provide an ecological setting for scattered holdings as the logical and necessary adaptive response. Rhoades and Thompson (1975, p. 539) maintain that 'the key to the success of agro-pastoral transhumance in Alpine valleys is the constant motion, the vertical oscillation of cultivators, herders and beasts following the vicissitudes of climate in an effort to exploit micro-niches at several altitudinal levels'. Such complex movements require a compatible system of land holdings that are distinctively fragmented. The typical pattern consists of individual ownership of small cultivated plots and hay meadows in the vicinity of the main village and communal ownership of the larger unfragmented forest and pasture lands at higher altitudes. Such dispersion limits the risk of bad years and serves to effectively schedule labour at successive stages (Netting, 1972, pp. 134 - 135). The system is maintained in a number of ways. Weinberg (1972) has pointed out that the 'pie' of property in the Swiss Alps is not cut into equal and ever-diminishing wedges which would seem to be the logical outcome of partible inheritance. Instead property is viewed functionally rather than quantitatively and this ideology acts as an adaptive mechanism ensuring economic success and cultural continuity. More specifically, Netting (1972, p. 139) has identified a series of automatic and volitional 'social servo-mechanisms' which regulate potentially disruptive factors such as uncontrolled population growth. Other researchers provide corroborative data from other parts of the Alps (Cole & Wolf, 1974, pp. 249 - 252; Friedl, 1974, pp. 27 - 28; Wolf, 1970), while similar mechanisms have been identified in other high altitude regions of the world such as the Andes and the highlands of Nepal (Rhoades &

Thompson, 1975).

Other examples of 'rational fragmentation' come from the Mediterranean where fragmentation, due to a number of reasons (inheritance practices, a long period of settlement, detailed spatial variation in microenvironment and climatic hazard), is well advanced. Data from a field study of a Greek peninsula, where cultivated land ranges from sea level to 700 metres and varies in aspect, support the hypothesis that the fragmented agricultural system is geared primarily towards stability rather than towards productivity (Forbes, 1976). Insurance against the risk of hail, excessive dampness or drought and the long-run stability of the agricultural ecosystem, which is subsistence-orientated, are seen as rational factors underlying a very high degree of fragmentation - the average holding consists of 2.9 ha. divided into 18 plots. A wide range of crops - wheat, barley, oats, sorghum, vetch, peas, beans, vines, fruit trees, grazing etc. - is matched in detail to the multiplicity of microenvironments offered by the 'vertical economy' of the peninsula. However, the same crop may be grown at two or three altitudes in order to hedge against complete failure. Most fields are small terraces about 4 metres wide; agriculture therefore is unmechanizable.

Rather similar is Galt's (1979) study of Pantellaria, an island of volcanic origin south-west of Sicily. Here fragmentation is set in a monoculture of vines. The landscape is one of intensively cultivated vineyards enclosed in a matrix of carefully constructed terraces and walls. The island's rugged topography combines with climatic factors to produce a variety of ecozones. These in turn produce spatial variations in the grape crop in terms of harvest time, yield per vine, sugar content etc. Most farmers are owner-cultivators and possess land in four or five scattered plots in different ecological locations. This is to minimize the risk of complete failure in a dry year and to stagger the

demand for grape-picking labour. Fragmentation is thus an extremely rational adaptation to local environmental circumstances and the nature of the crop. Without fragmentation, Galt contends, the island could not support the relatively prosperous intensive agriculture it does for so many proprietor households. The system is maintained by small family sizes (generally only two children) so avoiding excessive fragmentation through partible inheritance.

Fragmentation may have other ecological benefits. Small plots and a mixed mosaic of crops may help to check the spread of plant diseases. Crops will benefit from greater protection from exposure to wind, and soil erosion will be reduced. Amenity arguments also play a part. Large, square, desolate fields have less aesthetic value than a 'patchwork quilt' of smaller, irregular plots. Hedgerows provide an important sanctuary for plant and animal life in a countryside where farming is becoming more intensive and specialized. They may be more important than an equivalent area of woodland because they form a network, rather than a patch, of uncultivated environment. Farm consolidation and field enlargement reduce hedgerow length (Teather, 1970). In the Netherlands consolidation procedures include the planting of areas of woodland for ecological and recreational purposes, to compensate the loss due to field enlargement (Bentham, 1969).

1.7. LAND CONSOLIDATION - THE SOLUTION?

The concept of land consolidation is an ancient one. In the fourth century B.C. the Chinese sage Mercuis proposed the logical division of rural land into square units and suggested that small villages be composed of nine such units. The logic of this operation became a well-established system which spread, in various forms, to other East Asian territories as they drew on the Chinese culture matrix.

Today consolidated, as opposed to fragmented, land is seen to have

many advantages. The problems of fragmentation, when stated in opposites, become the solutions of consolidation. Similarly, some of the difficulties with, and drawbacks to, consolidation programmes are often bound up with the more rational aspects of certain fragmentation situations. Some of these problems are considered in more detail in the next chapter.

Usually, land consolidation operations are only concerned with excessive fragmentation – that which is irrational and does not occur for reasons of agricultural convenience or efficiency. They are a necessary and continuing response to demographic and technological developments. They represent a measure of adjustment and play a prominent part in agricultural development. Although there does exist a natural process of adaptation this is generally too slow; tradition and the agrarian structure continue to conflict with the needs of economic progress. The capacity of the individual farmer and his village is seldom adequate to overcome the difficulties involved in the adjustment; therefore, government initiative and support are needed.

Land consolidation can be conceived as a co-ordinated effort to stop the trend towards fragmentation and to integrate agriculture into the economic development of the country by remodelling production conditions on the farm and by improving the standard of life of the rural population. In advanced countries land consolidation is often seen as the first step toward placing the standard of living of the agricultural population on a comparable footing with that of industrial workers. In less developed countries, where fragmentation can hold down the income of the farming family, consolidation potentially plays a more vital role in the equitable sharing of any benefits of economic or social progress.

Land consolidation operations have two basic aims: to increase productivity per man and to increase the productivity of the land. In advanced

countries the first of these aims is usually given priority, whilst in developing countries primary attention is attached to increases in yields and, where relevant, to more effective utilization of irrigation water. Particularly in less developed countries, where financial resources are limited, the priority given to land consolidation will depend on the likely returns when compared to those resulting from other avenues of investment. Nevertheless, in many cases the urgently needed increase in production from small agricultural holdings can only be achieved by land consolidation operations. Often idle manpower available in most of these countries can be utilized in schemes without damaging the prospects of competing projects.

On a theoretical level land consolidation is thought to have several advantages. Johnson (1970) has postulated the economic gains that may be expected from consolidation. Three assumptions are made: that all parcels of land are homogeneous; that the decision-maker expects an increase in wealth as a result of consolidation, due to more efficient management and land use; and that this expectation arises from anticipated lower transport and supervisory costs. On a consolidated holding, the farmer saves time when moving between plots. More importantly he saves time and cost in moving equipment from one parcel to another. Gains are particularly significant when heavy machinery is involved. It is also easier for the farmer to supervise the activities of his labourers and helpers.

When these specified assumptions do not operate, consolidation operations may not succeed. For example in a subsistence economy there are no gains to be made from consolidation - indeed, there could be a loss. Jackson (1972) shows that in rural Africa, with its mainly subsistence farming, the supposed benefits of consolidation do not appear to be appreciated by many groups of farmers. In Japan, where farmers do not utilize heavy machinery, consolidation was difficult to implement (Hyodo, 1963).

The economic argument advanced above also assumes rationality on the part of the farmer. Yet much work exists from behavioural geography to show that spatial behaviour is dependent on the perceived environment. For example, the theoretical analysis assumes that individuals know the advantages of consolidation and that these are perceived favourably, but in the eyes of many rural dwellers consolidation schemes may be seen as a meddling, bureaucratic interference in the natural workings of rural life.

1.8. THE EXECUTION OF CONSOLIDATION SCHEMES

To fully review all aspects of consolidation operations, particularly the often complex legalistic procedures, would be impossibly cumbersome. Instead this section examines certain general features of the process of land consolidation.

The preparatory phase is composed of three parts: the establishment of executive committees and the defining of the consolidation area; the determination of the land's legal status; and the classification and valuation of land. Each of these is now examined in more detail.

In the majority of countries special bodies are charged with well-defined responsibilities for the implementation of consolidation projects. The decision to proceed with consolidation may come from either these agencies, independent public authorities or groups of holders. Often an 'Executive Committee' is established, consisting wholly or partly of owners and tenants from the area involved. This is the decision making unit, although the progress of operations conducted solely by committees of land-holders tends to be slow and rather painful.

Most countries have precise rules governing the delineation of consolidation area boundaries and the determination of the proportion of land to be included in the area. In West Germany, a consolidation area consists of one or more villages or parts of villages laid out to achieve rational

land reorganization. In Switzerland a consolidation area is defined more by natural or economic boundaries. In Sweden and Japan consolidation applies to all properties in the delimited area, while in Denmark only 25% of the owners' property needs to be included in the scheme. For more details and inter-country comparisons see Moral-López (1962).

The determination of the correct rights over properties subject to consolidation is often regarded as being of utmost importance if the consolidation scheme is to be successful. In Uttar Pradesh (India), for example, the state Land Consolidation Act requires the revision of maps and land registers before consolidation can begin. Often, however, the registration of land rights is a time-consuming process. Many countries have therefore devised methods designed to avoid delays in consolidation procedure while protecting the rights of the parties concerned. In Spain, for instance, farmers are called upon to present documents on which their land rights are based, but the absence of titles does not necessarily prevent consolidation from proceeding.

Consolidation is an exchange operation. A basic principle of the exchange is that each participant has the right to receive, under the reallocation, land corresponding in value to the land originally possessed. The proper valuation of land is therefore an essential operation. Generally this valuation is made on the basis of the land's natural fertility and productivity, but other aspects such as fixed capital in the form of orchards, buildings, etc, may also be taken into account. Many countries use a points or indexing system for different types of land. In some countries values are determined by experts designated by the consolidation authorities. In Belgium, properties are classified by the consolidation committees and an advisory commission. Binns (1950, p. 28) thinks that the best solution is for valuation to be made on the advice and unbiased opinion of leaders of the local farmers. When this is done, farmers are generally

satisfied that consolidation has produced a fair and equitable result.

Certain special provisions may apply at the preparatory stage. In West Germany no changes may be made in land use after the consolidation order has been issued: this is to prevent owners from hastily trying to up-grade the value of their land prior to valuation. Many countries prohibit sale of land while consolidation operations are in progress. In Sweden it is forbidden to remove top soil or to allow the productive capacity of the land to decline through negligence once a consolidation order has been made. Many countries pay compensation for land which may be needed for common facilities such as access roads and irrigation works, or land may be deducted from the overall consolidated block in proportion to each owner's holding. In Spain small uneconomic parcels offered by their owners may be acquired by the Consolidation Service in order to enlarge undersized farms, whereas in West Germany participants may voluntarily accept cash compensation rather than land in the consolidation scheme. In Morocco common land may be divided in order to procure land needed for consolidation.

A number of general principles govern the format of the newly consolidated farm landscape. Usually the new parcels must be as large in size, compact in shape and few in number as possible. Each owner is normally allocated his land at the place where the largest part of his original fragmented holdings is situated, or, in a pattern of dispersed settlement, around his farmhouse. Where complementary construction works have been carried out, each plot must have direct access to roads and, where relevant, irrigation facilities. It is usual to fix a minimum holding size and to expropriate all land below this - the exact opposite of a conventional land reform where an upper ceiling is established and land above this is expropriated. In this way problems of fractional shares are eliminated. Land obtained is redistributed and compensation paid.

In many European countries construction work accompanying land consolidation schemes is usually associated with the resettlement of farm

families (Jacoby, 1959 pp. 33 - 36, 88 - 92). This represents a logical solution for farmers who cultivate their land over large distances and whose existing dwelling is located in a congested site such as an old cramped village house. Resettlement has been of particular importance in Holland, Germany and Switzerland with the establishment of the 'homestead holding'. A mapped example of a Dutch consolidation - cum - resettlement scheme from the Land Van Maas en Waal West can be found in Jacoby (1959, p. 34) and in Lambert (1963, p. 48).

More recently, however, rural sociologists have indicated doubts about the appropriateness of isolated homesteads in newly-established landscapes. Improved roads and the diffusion of motorized transport amongst rural people make it possible to cover distances of say, 5 to 10 km in a matter of minutes. The advantages of village life-social interaction and access to services - are frequently considered more important than the disadvantages of some separation of farm and fields. Jacoby (1959, p. 25) has stressed that nucleated village settlement is better suited to keeping the younger generation on the land.

Finally, a brief mention must be made of the cost of land consolidation. The operation of consolidation calls for financial resources which are usually beyond the reach of farmers. Their attitude towards consolidation often depends directly on the financial assistance available to them. Since consolidation is undertaken partly 'in the public interest', most governments bear at least some of the expenditure. Various problems of financing are considered in more detail in the next chapter.

1.9. THE EXTENT OF LAND CONSOLIDATION ACTIVITIES

Moral-López (1962, p. 3) has drawn up an exhaustive list of those countries which have consolidation legislation. These countries are indicated on Figure 1.1. However, the list of countries that have actually undertaken official programmes of land consolidation is rather smaller. On

a global level countries with land consolidation legislation can be broadly divided into four groups: a Western European group including Finland, Sweden, Norway, Denmark, the Netherlands, West Germany, France, United Kingdom, Ireland, Switzerland and Austria; a Southern European or Mediterranean group including Spain, Portugal, Italy, Greece, Turkey and Cyprus; the 'developing countries', prominent among which are India, Taiwan and Kenya; and finally Canada. Consolidation activities have their origin in the first group and this is also where current programmes are most developed. In the second group consolidation operations are more recent even though problems of land fragmentation are more severe. The third group contains a limited scattering of consolidation programmes in various countries, usually following in the wake of radical changes in land tenure. In many of these 'Third World' cases the importance of the consolidation process is obscured by more pressing difficulties. Finally, consolidation operations in North America are of a more limited nature, partly reflecting the relative recency of agricultural settlement and development. Each group is now examined in more detail.

1.9.1. Western Europe

The countries of Western Europe reveal a striking variety of approach to the task of consolidation, a variety which stems not only from differences in their physical geography but also from their varied financial resources, social traditions and political circumstances. This is reflected in the variety of terminology used: Kommassierung in Austria; Flurbereinigung in Germany; Ruilverkaveling in the Netherlands; Integralmelioration in Switzerland and Remembrement in France. Table 1.1. presents a comparative picture of the extent of consolidation activities in certain West European countries.

In most countries in this group land consolidation operations have a long history. Reorganization of farm boundaries began at least three centuries ago with the first enclosure movements in Finland and Sweden. The medieval open-field system with its scattered strips was reshaped, where

TABLE 1.1

WESTERN EUROPE: LAND CONSOLIDATION, 1971

Country	Total Agricultural Area (['] 000 ha.)	Area Consolidated (['] 000 ha.)	Area Still to be Consolidated (['] 000 ha.)	Average Annual Consolidation (['] 000 ha.)	Consolidation Ratio ($\frac{\text{Old}}{\text{New}}$ Parcels)	Average Cost/ha. (U.S. \$)
West Germany	12,850	5,029	10,100	286	5:1	700
France	30,830	6,900	15,000	470	4:1	170
Netherlands	2,250	435	1,140	50	2.5:1	1,400
Austria	1,540	472	850	25	3.5:1	250
Switzerland	1,230	190	360	5	4:1	800

Note: Average annual consolidation rates are for the late 1960's.

Source: OCED (1972, p.25)

possible, into single plots. A second enclosure movement began in Finland in 1803, attempting to create a landscape of compact farms, each with the farmstead in the middle of its fields. A third phase was initiated in 1827 as continued population growth caused increased pressure on the available land. In the early twentieth century, rural-urban migration in Sweden led to the abandonment of marginal areas and released pressure on other rural land. Land consolidation was now conceived as a method capable of checking this trend (Yetterborn, 1963).

In Norway early consolidation operations were spatially confined to the western coast and fjord districts where the farms were concentrated in 'tuns' surrounded by their minutely subdivided fields (Lambert, 1963, p. 35). Consolidation began effectively by 1859 and by 1959 over half a million hectares of agricultural land had been affected. The principle of individual succession and the family right of redemption of alienated land have meant that the impetus to consolidation is less than in other countries in this group.

In comparison to her Scandinavian neighbours, Denmark's progress in consolidation has been rather more rapid (Binns, 1950, pp. 41 - 54). Here consolidation activities have fewer technical problems because of better soils and the system of primogeniture which have tended to maintain a continuous landscape of large and fairly compact farms (Hirsch & Maunder, 1978, p. 76). With the process of reallocation virtually complete by 1835, Denmark is now concentrating on increasing farm size through a process of farm amalgamation.

Consolidation activity in the Netherlands, by contrast, began at a much later date, with the necessary legislation first being passed in 1924. The best consolidated farms are found in the reclaimed land of the Zuider Zee (Vanderpole, 1963, p. 348; Rossem, 1963, p. 554). More recently, integrated consolidation activities, together with other infrastructural changes, have been attempted in rural areas with particular emphasis on reclamation work (Ozen, 1974, p. 27; OECD, 1972, p. 149). Like Denmark,

Holland is now concentrating on enlarging farm units, but in the latter case through the encouragement of group farming operations (Hirsch & Maunder, 1978). In neighbouring Belgium consolidation activity has been significantly curtailed by peasant distrust and because the 1951 law relied on voluntary applications.

In Alpine Europe, due to physical difficulties, the problems of land fragmentation are intense. In Switzerland the most severely fragmented cantons are Valais, Grisons and Ticino. Consolidation activities, although slow up until 1940, have been well documented (Jacoby, 1959, p. 40; Binns, 1950, pp. 77 - 89). Greatest activity has been in the north-eastern plateau, where resettlement of farmers from congested villages has taken place (Lambert, 1963, p. 43). In Austria consolidation measures were enacted in 1883 but progress has been very slow. Current activity is much more extensive with most progress being made in the floodplain of the Danube and the low hills near Vienna.

Problems of land fragmentation and small holding sizes are not as intense in the United Kingdom as in the rest of Europe. Like her Scandinavian neighbours the enclosure movements of the eighteenth century created a rural structure of large units (Hoskins, 1955, pp. 157 - 159) which has been maintained by the prevailing system of inheritance and rural outmigration. Where fragmentation has developed it is frequently the result of land purchase at some distance from the original holding (Butterwick & Rolfe, 1965a, p. 447). Fragmentation is generally most intense in the hill sheep farming areas of Wales and the crofting districts of Scotland. The 1947 Agriculture Act allows for the prevention of farm subdivision and the preparation of schemes for amalgamation and consolidation. In some large estates consolidation operations have been successfully carried out (Jones & Jones, 1965) and in Scotland Clark (1979) has noted some consolidation through farm amalgamation. Elsewhere it has been decided that consolidation costs far outweigh any improvements in efficiency that may result.

In Ireland the situation is very different. Land fragmentation and small holding sizes prevail, primarily as an inheritance from the past. Norman and Tudor confiscations and the Cromwellian plantations forced much of the native rural population into the west. The consequent rural congestion, combined with the system of inheritance, large families and poor land, created excessive fragmentation. Land was often held in 'rundale' or scattered strips, frequently unfenced and without proper means of access. The Congested Districts Board set up in 1891 attempted some limited consolidation but was dissolved in 1921 and the reconstituted Land Commission is now the prime agent for consolidation activities (Lambert, 1963, p. 43). Since 1891 some 23,400 holdings have been consolidated, but the problem of fragmentation still persists in the west (O'Sullivan, 1970, p. 2). Current concern is focused on farm enlargement and there is now greater recognition of the role of 'natural adjustment' (Attwood, 1980, p. 23).

It is in the two remaining countries of this group, France and Germany, that land consolidation activities are most developed. German progress in land consolidation is extensive and dates from an early attempt in southern Bavaria in 1550 (Lambert, 1963, p. 37). However it was not until 1937 that a common consolidation law was introduced for the whole country (Schiller, 1963, p. 561). Rapid expansion of consolidation activity took place after 1948, particularly in the south-west where fragmentation was most severe. More recently the classic Fleurbereinigung has been discarded in favour of wider integrated programmes which contain a variety of measures, including farm buildings and resettlement (Mayhew, 1970, p. 55; 1971, pp. 61 - 75). However much early consolidation is considered unsatisfactory and must now be redone, often using new accelerated measures (Clout, 1972, p. 109). Land consolidation continues to remain a central measure in the improvement of German agrarian structure (Hirsch & Maunder, 1978, p. 25).

French consolidation is of a rather different nature. Although sporadic enclosures were made in Lorraine and Burgundy during the seventeenth

and eighteenth centuries it was not until the nineteenth that more general legislation was introduced (Lambert, 1963, p. 38; Bergman, 1952; Roche, 1963, p. 333). After the First World War farmers were allowed to form associations to carry out voluntary consolidations, but these early schemes were few in number and were concentrated in areas of wartime destruction along the northern frontier (Clout, 1972, p. 106). An official programme of remembrement was started in 1941 when 14 million hectares were considered to be in need of immediate reorganization. Thirty years later over 6 million hectares had been consolidated with most of the work being carried out in the north and east. In the south and in the mountains costs are greater and peasant unrest stronger. Unlike Germany, consolidation in France is a collective operation carried out on a communal basis, supervised by the Service du Remembrement. In more recent years attempts at structural change in French agriculture have focused on the enlargement of holdings and with this specific aim in mind consolidation activities have been reinforced by the establishment of SAFERs (Sociétés d'Amenagement Foncier et d'Établissement Rural). Established in 1960 and with origins in experiments undertaken by enterprising administrators and young peasant leaders, SAFERs have legislative powers to intervene on the open land market in an attempt to rationalize the prevailing agricultural structure (Butterwick & Rolfe, 1965b, p. 548). The scale of operations of the 28 SAFERs varies considerably and their general success has been attributed to their ability to overcome peasant mistrust and conservatism (Perry, 1969 and 1971). As a result of SAFER activity land consolidation operations have increased dramatically although, unlike Germany, such operations are rather simple, with infrastructural works being kept to a minimum.

1.9.2. Southern Europe and the Mediterranean

The experiences of land consolidation in this group are generally much more recent and usually of a limited nature. Problems of land fragmentation are often extreme and are compounded by peasant conservatism and traditionalism, the prevailing inheritance laws, subsistence levels of agriculture, difficult

terrain and water shortages. While many of the countries in this group are rather backward in terms of European agricultural development they are currently engaged on programmes of rapid improvement and modernization in which some methods of consolidation developed in northern Europe have been borrowed.

In this group only Spain has an established tradition of consolidation. Here fragmentation of land has occurred at two levels. In the first, land is distributed in a large number of excessively small holdings known as minifundia, while in the second a single holding is made up of many scattered, tiny parcels (Naylon, 1959). Fragmentation is particularly severe in the north and north-west where the problems of minifundia persist. It is less serious in the Basque provinces and Catalonia owing to the traditional mayorazgo system of succession where land is passed to the eldest son. Decisive attempts at consolidation were introduced in 1952 with the creation of the Servicio de Concentración Parcelaria now known as IRYDA (Guedes, 1981, p. 28). Activities have been concentrated in the Old Castile and Leon regions, mostly because of the favourable land tenure structure and the willingness of farmers here to participate. Land consolidation has become an identifiable need felt by rural communities as well as a central part of government agrarian policy (de Oteyza, 1969). Recently the authorities have recognised that consolidation alone is insufficient and broader rural development schemes have been introduced with the aim of creating viable economic holdings (OECD, 1969, p. 274). By the end of 1977 almost 5 million hectares of land had been consolidated, affecting one million farmers.

In neighbouring Portugal, however, little has been done to resolve an extremely serious problem of fragmentation. It has been estimated that more than half of Portuguese farmland is in need of consolidation, with fragmentation being most severe in the north and eastern provinces (O'Flanagan, 1980). The consolidation of holdings has only been attempted in two small zones, each covering about 100 hectares, one in the north and one in the south

(OECD, 1969, p. 189). Apart from these pilot schemes, farm structure remains relatively unchanged.

Italian measures to combat land fragmentation have followed a series of land reforms attempting to remove problems of the large estates or latifundia. The inheritance laws and population pressure have resulted in the repeated subdivision of properties throughout Italy, with particularly severe conditions in Southern Italy and the islands. Here water shortages have added to farming problems and as a result land consolidation activities are linked to wider schemes of rural development, particularly irrigation projects (Lambert, 1963, p. 44). In spite of the increasing severity of the problem, the pace of consolidation has been slow. The Cassa per il Mezzogiorno, a government development body, has recently been promoting a co-operative approach to the amalgamation and consolidation of small farming units in the south. A noted side effect of consolidation has been the localised reduction in emigration (Cesarini, 1977).

Like Spain and Italy, fragmentation in Greece is associated with small holding sizes. Fragmentation is greatest in the south and the islands where scattered holdings constitute a serious obstacle to the technical and economic development of Greek agriculture. Consolidation schemes, in one form or another, have been in operation since 1953 (Papageorgiou, 1963). Until 1959 consolidation was carried out on a voluntary basis, but compulsory schemes have now been introduced. However, compulsory consolidation, first introduced under the 1968-72 Five-Year Plan, is only carried out within the limits of large public irrigation or land improvement schemes (OECD, 1969, pp. 84 - 121).

In Turkey most state effort has been directed towards land redistribution with the result that the issue of farm fragmentation has been neglected. Problems of land fragmentation are therefore severe in many areas and are compounded by the fact that only 30% of Turkish land is officially registered (Busch, Busch & Uner, 1979). Current interest is being focused on the

development of co-operatives as a means of increasing holding size and combating fragmentation. In this context consolidation is linked to the implementation of irrigation schemes (Ozen, 1974).

Across the sea in nearby Cyprus consolidation measures are a much more recent phenomenon. The first consolidation law was passed in 1969 and since then there has been a rapid expansion of consolidation activities, often linked to developments in irrigation (King, 1980a). The story of Cypriot fragmentation and consolidation is picked up again in Chapter 3.

1.9.3. Developing Countries

Land consolidation is not restricted to European and Mediterranean countries. Problems of land fragmentation are also severe in Asia, Africa and Latin America. Usually consolidation activities are of a recent nature, although in some cases they have developed from direct links with European countries during periods of colonization. In some cases the attempts to implement a 'Western approach' to consolidation have failed.

Land consolidation operations are well established in India where they have a history of roughly three-quarters of a century. Activities can be divided into four phases. The first, from 1900 to 1920, involved only isolated consolidation experiments. This was followed, from 1920 to 1940, by a period of consolidation through co-operative societies. The third and fourth phases have involved the enactment of consolidation laws, first on a voluntary and then on a compulsory basis (Zaheer, 1975). In recent decades, consolidation operations have been incorporated into Five-Year Development Plans (Singh, 1978). Consolidation methods do, however, vary considerably between states. In Bihar, for example, consolidation has never been strongly encouraged and costs remain high. In contrast in Uttar Pradesh, where consolidation activities are well documented (Agrawal, 1968; Trivedi & Trivedi, 1973), consolidation is strongly linked to village planning. Unlike the European experience, voluntary consolidation in India has been a failure and all schemes now include elements of compulsion. Official corruption has also

magnified problems of peasant mistrust of government action. In 1962 the Punjab had already reorganized 95% of its fragmented land, followed by Uttar Pradesh with 18%. More recently consolidation activities have become an integral part of irrigation projects (Wade, 1975).

African experience in land consolidation is limited to Kenya, Sudan and Egypt. In Kenya an active policy of land consolidation and registration has been pursued since 1950. Land consolidation involves the enclosure of land held under customary tenure (Lawrence, 1970). It has a large element of compulsion which is easily accepted by the tribal authorities. The consolidation programme quickly gained momentum after 1950 with a massive acceleration between 1967 and 1972.

Contrastingly, in Egypt and the Sudan land consolidation has been applied at the land-use level. This has been well documented by Jacoby (1968, pp. 41 - 42) and has the advantage that it does not affect property rights in the land. The Sudanese Gezira Scheme regrouped scattered plots into compact blocks for the cultivation of sorghum, cotton and fodder crops. These blocks are also guaranteed a far more rational use of water. In Egypt the 'Unified Rotation Co-operatives' established a rational farm structure as a part of the Egyptian land reform. Holdings were allocated to beneficiaries in three parcels, each parcel being part of a larger block of land use - cotton, wheat and clover on a three-year rotation. These principles have been adopted voluntarily outside the land reform zones (King, 1977, p. 387).

In Asia the historical lead in consolidation in the modern period has been taken by Japan. In 1899 the Japanese government introduced an Arable Land Re-adjustment Law which provided for the merger of fragmented plots. Later, the 1949 Land Improvement Act included land consolidation as one of its provisions. The recent rapid reorganization of Japanese agriculture has given consolidation operations a new impetus. However, because such operations are carried out in paddy lands, the nature of the work as well as

the consolidation process is quite different from the other countries reviewed here.

In nearby Taiwan, the severity of land fragmentation has been increased by continuous population growth. Land consolidation plays a significant role in rural improvement and has followed on the heels of the land reform programmes of the 1950s. First attempts were made during a pilot project in 1959, followed by a more ambitious project covering 3,362 hectares. This was successfully completed in 1961 and in the same year a 10-year land consolidation programme for the island was begun (Williams, 1976, p. 429). A second phase of consolidation started in 1973 and it is expected that most of Taiwan's agricultural land will be consolidated by 1983.

1.9.4. North America

Problems of land fragmentation have already been noted in the North American context (see Section 1.3). In French Canada, division among heirs has splintered the 'ladder farms' along the St. Lawrence, while in the U.S.A. fragmentation occurs not only in the Great Lakes cut-over region and the Southern Appalachians but even in the Mid-West where holdings consisting of several discrete large blocks are now in evidence. The situation, though, is not as severe as in the other countries considered so far. This is partly explained by the fact that agricultural land was laid out on a more systematic basis and in larger units than in Europe. The relative newness of the agricultural landscape has prevented the sort of excessive subdivision found in other countries and natural adjustment can more easily occur because the agrarian structure is not as rigid (Cummings, 1980). However, the increasing demands of mechanization have required larger and more compact units, and in Canada farm consolidation is employed with the primary aim of enlarging farm units (Bunce, 1973).

1.10. NEW APPROACHES TO LAND CONSOLIDATION

In recent years several new approaches to consolidation can be

identified. To some extent these reflect wider changes in attitudes to the problems of agrarian structures and an acceptance of the limitations of the consolidation method per se. These new approaches include farm enlargement, greater farmer participation and regional social development.

Consolidation in itself does not necessarily reduce the number of holdings or increase their size. The impact is at the plot level. Long term effects, moreover, may take several years to mature. For instance, the increase in land values due to consolidation and the psychological effect of being confronted with a new farming pattern and its attendant management problems may incite elderly farmers to sell, especially if retirement support is available. Renting may be a more attractive proposition to the entrepreneur. As a result, the scale of farming is enlarged. Consolidation may, therefore, set in motion cumulative structural changes which go far beyond the initial parcel swapping and parcel enlargement. Within Western Europe farm enlargement is a basic objective of national and Common Market agricultural policy, yet it is taking place generally much more slowly than desired (Rickard, 1970). Many farms are still not viable - in European terms - even after consolidation and enlargement. Bergmann's concluding sentence, in a study of French consolidation published 30 years ago, is still valid for much of rural Europe today; 'The agrarian structure is enveloped in a straight-jacket and while remembrement gives a little more breathing space, it does not liberate it from its rigidities, frictions and major inefficiencies' (Bergmann, 1952, p. 32).

Several countries in Europe have attempted to adapt their existing consolidation programmes so that the objective of increasing farm sizes can be more easily realized. This move has been recognized by FAO who had a close involvement with land consolidation throughout the 1950s and 1960s. FAO publications specifically on land consolidation, however, ceased in 1968 and attention has since focused on wider aspects of agrarian structure. Land consolidation is now conceived as one tool among many to effect

structural change; others include the activities of public institutions in distributing land, discontinuation and retraining schemes, and farm amalgamation policies (OECD, 1972). In developing countries, consolidation programmes have tended to retain the 'traditional' element although some dissatisfaction has already been expressed with their failure to create viable units; in the future, changes following the developments in Europe are envisaged.

Increasingly farmers' active participation in consolidation operations is being encouraged. This generally helps radical adjustments in farm structure to become more acceptable. Such an approach also stimulates group and co-operative action and increases the speed and efficiency of consolidation operations. In the Netherlands infrastructural work on individual farms is no longer the responsibility of the consolidation authority and is left instead to the farmers themselves. The resulting overall reduction in costs makes it possible to carry out land consolidation on a larger scale. Free exchange of plots is also being encouraged in some countries and obstacles which have previously hindered an extension of this technique have been overcome by specific fiscal incentives. These smaller schemes have advantages of flexibility and may facilitate rapid reorganization in the future.

There is, perhaps, a danger when examining land consolidation schemes that considerations of technical perfection and easily-measured output changes tend to override the longer-term and more general economic impact, including social and psychological effects. These effects are not only important at the farm level. Consolidation operations also make a contribution to improving the infrastructure of the region concerned. In recent years in West Germany and the Netherlands, land consolidation programmes have been undertaken in regions which required an overall re-orientation for non-agricultural reasons. In such cases the benefits accrue not only to agriculture but to the community as a whole.

With the development of these new approaches has come the recognition that land consolidation is not a panacea for the problems of agricultural structure. In fact consolidation operations suffer from many problems. These are discussed in more detail in the next chapter.

CHAPTER TWO

THEORETICAL AND METHODOLOGICAL BASES FOR THE STUDY OF LAND CONSOLIDATION

2.1. CRITICAL PROBLEMS OF CONSOLIDATION SCHEMES

Land consolidation, both as a concept and operationally, suffers from a number of problems. Several authors have discussed one or more of these; some in considerable depth (Binns, 1950, pp. 22 - 25; Jacoby, 1959, pp. 48 - 75; Meliczek, 1973, pp. 54 - 55; Moral-López, 1962, pp. 117 - 126).

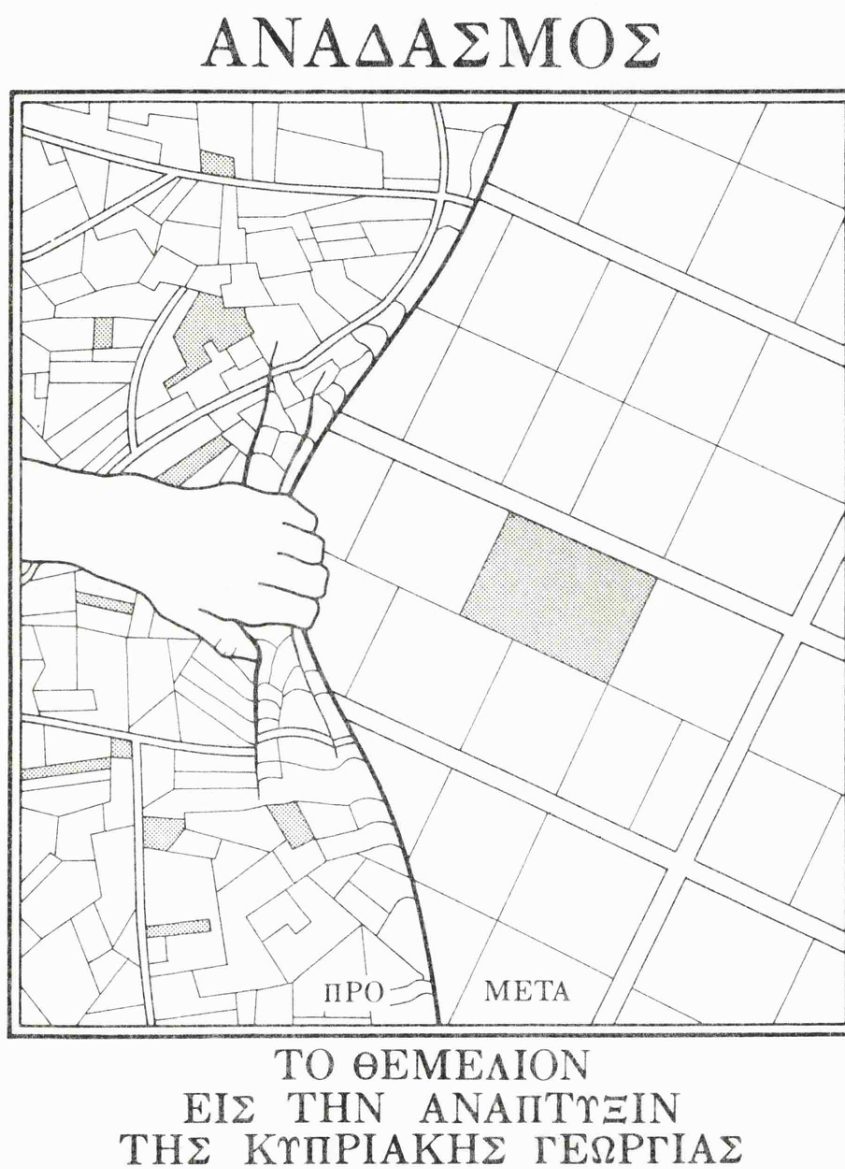
Major problems include: generating a positive attitude on the part of farmers towards the consolidation process; the choice between voluntary and compulsory methods of consolidation; the size of units to be established after consolidation; the cost of the consolidation process; the prevention of refragmentation in consolidated areas; general social and administrative problems and the evaluation of the economic and social effects of land consolidation. Some remarks on each of these 'critical problems' follow. The problem of evaluation, in particular, then provides a lead-in to defining and exploring the scope of this study.

2.1.1. Generating a Positive Attitude

By its very nature, the process of land consolidation strikes at the heart of any rural society. If the process is to be accepted there are

strong human factors to contend with. First, there is the inertia of peasant tradition which tends to obstruct all change. Secondly, there may be a special attachment to the fields that only the farmer knows and understands: 'perhaps largely sentimental, but strengthened by a not unnatural professional doubt as to the wisdom of changing his well understood land for something less familiar' (Binns, 1950, p. 23). Moreover, in all voluntary or partly voluntary consolidation schemes there is the obvious difficulty of getting a large number of people, however well intentioned, to remain in substantial agreement throughout the whole proceedings: even a few disgruntled land owners may wreck or seriously impair the best of schemes. What is needed, therefore, is the development of a 'positive attitude'. This requires above all the supply of information on land consolidation and on contextual matters such as the prevention of refragmentation. Generally land consolidation organizations recognise this fundamental need and great efforts are made to give extension and education their proper place within the framework of land consolidation. The promotion of land consolidation operations by the mass media and organised visits to completed schemes are carried out. Where this is done efficiently many of the difficulties usually associated with land consolidation schemes are eliminated. Consequently such schemes can proceed at a faster rate with savings in staff and time and often with improved results. Figure 2.1 shows a poster issued by the Cyprus Land Consolidation Authority - part of its campaign to educate peasant farmers as to the needs for, and benefits of, consolidation. In the Netherlands it is the agricultural extension services which provide both 'preliminary care', which prepares the farmer for the changes, and 'after care', which ensures effective utilization of the new holdings. Unfortunately, not many consolidation organizations provide this important service. In other countries, pilot model schemes have been developed and these have been used as examples for farmers contemplating land consolidation. Such schemes have often been successful in reducing scepticism (Meliczek, 1973).

FIGURE 2.1 LAND CONSOLIDATION POSTER, CYPRUS



Note: The Greek lettering reads: 'Land Consolidation: the fundamental effects for the Cypriot farmer'

2.1.2. Voluntarism versus Compulsion

The choice between voluntary and compulsory methods of land consolidation is a fundamental issue. Between these extremes lie a series of solutions, dependent on the social, economic and historical background of the country and the desire for speedy action; 'the legal and administrative approach has to be adapted to the mentality of the population ... in accordance with the probable psychological reactions' (Moral-López, 1962, p. 120). In Western European schemes participation tends to be fairly voluntary but there are other areas still strongly bound by custom and tradition where an element of compulsion may be favourably received by tribal authorities.

Compulsory consolidation presents few theoretical difficulties; the land is acquired compulsorily, redemarcated into compact blocks with adequate service lanes and roads and re-allocated to farmers. In practice, this method is used when it is desired to acquire the title of land for reasons other than the existence of fragmentation, or when irrigation or conservation projects are being implemented. For the most part, however, governmental action towards consolidation has aimed at encouraging voluntary action, which is then supported by some element of compulsion and by financial, administrative and technical assistance. The common attitude is that land consolidation schemes should not be started until a majority of the participants, usually controlling more than half of the land concerned, is in favour of the project. In some cases an even higher proportion of consenting owners has been required, but such restrictions have often been found to make operations very slow. Indeed, even the requirement of the consent of a simple majority may prevent consolidation where it is most needed.

It is generally agreed that the successful implementation of land consolidation schemes depends to a major degree on the atmosphere in the village. Consequently appropriate preparatory steps must be taken to secure

the goodwill and co-operation of the participants. The real issue then becomes one of co-ordinating educational and informational efforts in such a way that voluntary action, or a minimum of compulsion, will lead to desirable results. In this context it is useful to remember that, even in individualistically orientated countries such as France, compulsory action is to some extent part of the normal procedure. In the Netherlands and Sweden, where the execution of projects depends on the consent of all the participating owners, their absence in the preliminary meetings is construed as consent to consolidation procedures.

2.1.3. Size of Units to be Established

Most land consolidation measures attempt to go beyond a mere exchange of landed property and comprise measures for enlarging uneconomic smallholdings. Consolidation organizations must decide at the planning stage on the preferable size of holdings that they wish to create. Such a decision is largely influenced by social and economic considerations. If social conditions are the deciding factor, as they are likely to be in less developed countries, then the available land resources should preferably be distributed in such a way that the size of the new holdings allows a minimum net income for every smallholder in the district. If economic conditions are uppermost - the case in developed countries - then the criteria will switch to those of the economics of using modern farm equipment and, as a result, some farmers may have to be excluded from the consolidation scheme. Large mechanised farms are not labour-intensive and create unemployment. They also require considerable investments which are not normally available to the farmer. As a compromise, and in order to gain some economies of scale for small farmers, various new forms of group action have emerged in several countries and these often have a larger impact than traditional consolidation schemes.

2.1.4. Cost Aspects

The next series of problems is financial. No scheme of consolidation

can be implemented without considerable expenditure. Quite apart from the expenditure which may be necessary for surveying, plot demarcation, road construction and supervisory staff, it is almost certain that at some stage or other the dual questions of compensation for loss and payments for benefits will also arise. Farmers who have either lost land or been dispossessed will naturally expect compensation. It will usually seem reasonable that this compensation should be obtained from those farmers who have benefited, but these may not accept the official estimation of their gains or, even if willing to pay, may lack funds. Capital will thus be required to organise the consolidated farms and special credit arrangements may be necessary for this purpose. Such expenses will normally be met initially by the consolidating authority or by the relevant permanent departments of the government and a substantial part repaid eventually by the farmer. Funds may also be necessary in connection with measures for the prevention of refragmentation or for the establishment of long-term credit organizations. Land consolidation is also a time-consuming process with schemes taking an average of five years to complete. Time becomes an important cost factor as does the location of schemes. For example, in mountainous areas the consolidation process may be hampered by the high cost of road construction.

The high cost of traditional schemes, especially where land consolidation includes various infrastructural improvements such as roads and new dwellings, has forced many countries to abandon such programmes. Instead, recent attempts have been made to lower costs by introducing 'accelerated' schemes. Legislation in some countries now provides opportunities for simplifying and streamlining consolidation procedures.

2.1.5. Prevention of Refragmentation

To maintain the state of consolidation, by the prevention of future excessive sub-division and fragmentation, is as important as the consolidation of holdings which are already fragmented. Measures designed to

prevent or restrict refragmentation are usually provided for within the provisions of the consolidation law. The establishment of minimum sizes has been a common approach. Experience has shown, however, that minimum sizes alone are not sufficient to prevent refragmentation. The problem is a complex one since even the strictest legislation may not prevent the landholder from ignoring the restrictions, or from finding ways to get round them. Legislation must also take into account customs and traditions, particularly with regard to inheritance rules. It is obvious that the rigid prohibition of sub-division is not an ideal solution since it does not recognise established societal processes or the need for individual arrangements. Instead the emphasis has to be placed on compromise solutions which slow down the progress of refragmentation. European countries have introduced rather different systems for this purpose. The majority believe in prevention or, at least, in the possibility of restricting the right to effect sub-division and fragmentation. Attempts are made to establish conditions that are favourable for maintaining consolidated holdings. In Sweden, for example, a distinction is made between legally sub-divided holdings and those that are sub-divided by private agreements. In the latter case such holdings can only be mortgaged with difficulty and are excluded from government grants for improvements. In other countries credit facilities may be available which give financial support only to the succeeding heir, thereby encouraging him to take over all shares in a jointly held estate.

2.1.6. Social and Administrative Problems

This leads on to what may be loosely called 'social-administrative difficulties'. Under this heading comes a number of miscellaneous difficulties deriving from the organization of the community itself. In many countries the land may be owned by one set of persons and worked by another but the second set of persons may have well-established rights which must be considered equally with those of the owners. In extreme cases, as in India, there may even be a number of intermediaries between the 'owner' and

the farmer, all with rights and expectations of profits. Land may also be owned jointly, sometimes in a very complicated manner and, in some cases, water rights and trees are owned separately from the land. Where a large number of interested parties exists administrative problems become complex. In Indian land consolidation schemes, for example, this problem has worsened existing difficulties of corruption at the administrative level.

It is important to recognise the variations in administrative difficulties between developed and developing countries. In advanced European countries the existence of the concept of peasant 'self-help' has frequently brought favourable reactions to consolidation and governments have been able to limit themselves to giving financial support to individual action. In less advanced countries consolidation operations have had to be integrated more forcefully into community development programmes.

Further difficulties exist over the defined area of consolidation schemes. This is often, for convenience, based on established administrative units, although experience has shown that consolidation operations should apply to the entire holding or to all holdings which make up an economic unit, even though such holdings often lie beyond the limits of the administrative boundary. In some countries this problem has been overcome by integrating land consolidation operations into regional development programmes.

Lastly, there exists a serious area of conflict between administrative and social values. At the administrative level land consolidation is frequently viewed as a simple question of geometry, aiming at a schematic reduction of plot numbers and thereby ignoring the all-important human element.

2.1.7. The Question of Evaluation

Finally, the evaluation of the economic and social effects of land consolidation is a difficult task and only a few countries have made an

attempt to appraise them. Where this has been done it has been possible to show that, at least on paper, the farming population have benefited. Under 'average conditions' the following effects have been noted in certain European schemes: gross yields increased by 20% - 70%; considerable change in working methods, with the elimination of unproductive effort, and reduction in manpower requirements (Jacoby, 1959). The intensification of the operational organization and the reduction of production costs have resulted in rising farm incomes and an increased standard of living. However, analysis of the available material also indicates that the effects vary considerably between individuals. Important factors here are the size of the farm in relation to the working capacity of the farming family and also the desired standard of living.

Methods of evaluation have varied considerably between countries. Three approaches are evident: comparison between newly consolidated areas and those remaining fragmented; comparisons between consolidated areas and 'model' villages; and long-term investigations of conditions in project areas prior to, and after, consolidation. Neither of the first two approaches is entirely satisfactory. It may, for example, be extremely difficult to locate a fragmented area with similar characteristics to the consolidated area under consideration. Comparison between consolidated areas and model villages, a common approach in West Germany, tends to stress economic factors, relying on an analysis of the ability of the farming population to achieve a predicted 'rationality' and ignoring conditions prior to the implementation of consolidation. Long-term investigations are more satisfactory, although problems occur in being continually able to locate a selected group of individuals. The success of this approach also depends on the availability of a reliable data source, researcher dedication over a span of many years and the time and money available for the investigation. An additional difficulty is the fact that the entire impact of a consolidation scheme normally becomes evident only some

years after its termination. To date, such factors have tended to limit the use of this method. In general, even countries with a long experience in land consolidation have not yet developed adequate methods of evaluation. Furthermore, much of the research is of a subjective nature (being carried out by the consolidation agencies themselves) and the lack of a common methodological base has meant that such work suffers from vagueness and lack of comparability. Too often evaluation has tended to concentrate on the re-organizational properties of land consolidation, assuming that economic and social benefits automatically occur. Cost-benefit analysis and rigorous sampling methods are difficult to find in the literature and there is an absence of studies of social and non-agricultural effects, especially of psychological and behavioural changes of participants. Where countries have integrated consolidation procedures into wider agrarian reconstruction programmes, there are problems of isolating the impact of land consolidation proper from the effects of other measures.

2.1.8. The Scope of this Study

The problem areas identified above provide the basis for an investigation into land consolidation operations. Of specific interest in the context of this research is the problem of land consolidation evaluation.

The following sections of this chapter set out a framework for the investigation and evaluation of the effects of land consolidation. Three approaches - cartographic, economic, and social and behavioural - are utilised in an attempt to provide a comprehensive methodology for the detailed investigation of land consolidation schemes. The geographic perspective is preserved throughout, with emphasis placed on inter-village comparisons and on the way in which consolidation progress has been constantly conditioned by local environmental factors.

2.2 THE CARTOGRAPHIC APPROACH

A recurrent theme in much geographical work is the construction and

analysis of maps. This cartographic emphasis provides a methodology for describing and understanding spatial phenomena and goes some way towards distinguishing geography from other fields of research. It was argued at the beginning of Chapter 1, as well as elsewhere (King & Burton, 1981, p.3), that geographers have been slow to grasp the fact that fragmentation and consolidation are manifestly spatial processes. Where farmsteads and farmers are badly located with respect to their fields, where fields are inconveniently located with respect to one another and where the fields are an awkward size and shape for modern farming practices (e.g. in tiny, wedge-shaped plots) both the problems and the solutions are inherently spatial. Any thorough evaluative study of land consolidation must, therefore, include as an important element some form of cartographic analysis.

2.2.1. Land Consolidation and Spatial Change

Much of the literature on land consolidation has been able to demonstrate that spatial change in farm structure does occur after the implementation of land consolidation schemes. Individual examples of this are plentiful. Naylon (1959), using a Spanish example, related how one farmer's holding was reduced from 314 plots to 16. In India, Zaheer (1975) demonstrated that average plot size increased from 0.11 to 0.29 hectares while the mean number of plots per holding was reduced from 45.5 to 16.3. Still in India, Agrawal (1968) distinguished between plot changes at two levels. At the ownership level average plot size increased from 0.6 to 1.02 acres while, at the operational level, average size increased from 0.55 to 0.91 acres. Some writers have presented maps and air photographs in a comparison of 'before and after' situations for various land consolidation schemes (e.g. Binns, 1950, pp. 13, 47 - 51, 80 - 81; Jacoby, 1959, pp. 54, 70; Lambert, 1963, pp. 51 - 52). Empirical studies on the effect of land consolidation on reducing distance between plots and on changing plot shapes are not to be found but these changes are intuitively recognised. Even so, the presentation of spatial information relating to agricultural holdings in statistical tables or in map form is by itself insuf-

ficient.

Several areas of cartographic and statistical measurement can be identified: firstly, the identification of the spatial elements of farm structure that change as a result of land consolidation; secondly, the objective measurement of these elements; thirdly, the comparative evaluation of farm structure before and after consolidation; fourthly, the evaluation of the relative significance of individual elements in the changing farm structure and, fifthly, the assignment of an overall measure of change for each land holder and an attempt to link this level of structural change to changes at the social, economic and behavioural levels.

2.2.2. Measuring the Spatial Effects of Land Consolidation

Attempts to evaluate the spatial effects of the land consolidation process to date have limited themselves to simple descriptions of changes in the relative levels of fragmentation. In fact, a number of relevant parameters can be identified. These include: the size of the holding; the number of plots; the size of plots; the size distribution of plots; the spatial distribution of plots and the shape characteristics of plots. The measurement of farm and plot areas is a simple matter and can most efficiently be carried out using a digitiser or graphics tablet linked to a computer or micro-computer.

The simplest consolidation measure, and that most evident in the literature, is the change in the number of plots per holding. More refined comparative measures are limited in number. Only one specific consolidation index has been proposed (Januszewski, 1968). However, certain indices - devised ostensibly to measure levels of fragmentation - can be usefully employed in a comparative evaluative study. Along with Januszewski's index, these can be briefly outlined as follows.

Simmons' (1964) index of farm fragmentation expresses the relationship between the number of parcels in a farm and the relative size of the

parcels. Distance is not incorporated into this index; in this respect each spatially separate plot is equally weighted, being distinguished only by its relative size in respect to the total holding area. The index is independent of farm size and so has an important comparative value.

Simmons' fragmentation index (F.I.) is given by the sum of the squares of the plot series (a), divided by the square of the total farm size (A):

$$F.I. = \frac{\sum a^2}{A^2}$$

A value 1 indicates a one-block holding; values tending to zero represent high fragmentation. Applying her index to 83 sample farms in Nottinghamshire in 1943 and 1963, Simmons found an increase in both farm size and fragmentation. Bryant (1974) also used Simmons' index in a more complex analysis of changing farm structure around the edge of Paris.

A rather different index was used by Schmook (1976) in an historical study of the evolution of farm structure in a village near Ghent (Belgium) between 1604 and 1950. This index, P_0 , is the ratio between the area of a polygon which circumscribes all the plots of one holding to the area of that holding. P_0 is always larger than 1; a large P_0 value indicates intense fragmentation. Again the index has comparative value, being independent of farm size. There are two problems with this method. Firstly, a highly eccentric plot distant from the main grouping may have a great influence on polygon size and so bias the P_0 value upwards. Schmook argues that this problem can be countered by calculating P_{-1} and P_{-2} indices, removing those eccentric plots from the analysis. Secondly, and more seriously, when plots belonging to a highly fragmented holding are distributed in a narrow, elongated polygon, P_0 can be rather small, even though fragmentation is intense. The results of Schmook's investigation show that fragmentation declined between 1604 and 1950 for all farm sizes except the very smallest, immaterial of the index used (P_0 , P_{-1} or P_{-2}).

In an attempt to evaluate the effect of distance between plots as a

function of fragmentation Schmook also calculated a weighted mean distance. The average distance from the farmstead to each plot was determined and weighted by the size of each plot (F_d). In order to obtain a realistic coefficient, F_d was divided by the mean holding size U , so producing F_d/U . The results again showed that spatial separation of plots was greatest for small holdings (under 9 ha.), for which size class it decreased on average by 60% from 782 metres to 476 metres. One problem with this method is that distance is calculated as the 'crow flies' and does not take into account existing routeways. The index also ignores the number of plots.

Another attempt to incorporate distance into a measurement of fragmentation was developed by Igbozurike (1974). His 'relative index of land parcellization' is based on the average size of plot and the distance covered by the operator in visiting all his plots in one round trip, ignoring the number of plots. The index is given by the equation:

$$P_i = \frac{\frac{1}{s}Dt}{100}$$

where P_i is the parcellization or fragmentation index, s is the size of each parcel and Dt the aggregate round-trip distance taking in all plots. The index appears to be an improvement over that of Schmook since it proposes to consider the 'actual' distance covered by each operator. However, it contains flaws. Firstly, Igbozurike is confused over the measurement of distance. He states that distance is to be measured as 'the actual total distance covered by the operator on a single round that takes him to all his parcels', whereas his diagrams measure distance as being the sum of individual return trips to each parcel. Secondly, he mixes units of measurement in his worked examples. This does not alter the relative ordering of the various examples' indices, it just depresses the figure misleadingly close to zero, which is the state of no fragmentation (so that a 5 plot holding gets a P_i index of 0.015). Logically, his example results should be multiplied by 100 (the ratio between kilometres and hectares). Perhaps the most

important criticism of the index is that it over-stresses distance and ignores the number of plots. To give an example, a farm with two plots of size s 10 km. apart would produce a P_i index twice as high as a holding with 10 plots of size s each one kilometre from its neighbour.

Finally, Januszewski (1968) proposes a specific consolidation rather than fragmentation measure. His index is, however, rather similar to that of Simmons already described, examining the number of plots per holding and their size distribution, taking into account the arithmetical rule that the square root of a sum of numbers is smaller than the sum of their square roots. His index of consolidation (K) is:

$$K = \frac{\sqrt{\sum a}}{\sum \sqrt{a}}$$

where 'a' is the area of each plot. The index ranges from 0 to 1, with higher values indicating a more consolidated holding. The index has three properties: the degree of consolidation decreases with the number of plots (i.e. K gets lower); consolidation decreases when the range of plot sizes is small and consolidation increases when the area of big plots increases and that of small plots decreases. Januszewski was able to demonstrate an empirical relationship between consolidation and farm size using data collected from 135 randomly selected holdings in Lower Silesia, Poland. He found a positive correlation between the size of holding and the degree of consolidation. The same index can also be used to express the degree of consolidation, or fragmentation, of cropping patterns within a holding or region. Fragmentation of land-use patterns has also been investigated by Board (1970) using intercept measurements of sample land-use quadrats, but his methodology is not easily transferable to non-contiguous, widely scattered farm fragments.

A final aspect of consolidation concerns the shape of individual plots. Attempts are made during the consolidation process to give plots a more compact shape to overcome the farming difficulties associated with excessively

elongated, pointed or irregular plots. There is now a considerable literature on measuring shape in geography. Much of it refers to physical phenomena such as pebbles, drainage basins and atolls, but there are a few human geographical examples including city and village shapes. Many of these shape indices can be used to measure the shape of plots of land. Methods of measuring shape which are relevant to field and plot patterns include those dealt with by Blair and Bliss (1967), Boyce and Clark (1964), Chorley (1959), Clark and Gaile (1973), Lee and Sallee (1970), Rasheed (1972) and Stoddart (1965).

Shape measurement has, however, presented a number of problems. Boyce and Clark's (1964) 'radial line' method, for example, can produce the same index for quite different shapes. Often quite complex operational problems are created as in Bunge's (1966) construction of a hinged polygon. Furthermore, researchers have generally ignored the functional significance of shape. In a study of shape related to land consolidation a measure of plot compactness is needed. While some workers have reached the conclusion that square or rectangular fields would be an optional farm structure, with the farmstead centrally located (Wheeler, 1973, pp. 50 - 52), at a theoretical level, and in terms of relative distance travelled from the centre to the perimeter, a circle is more efficient but, of course, this leaves voids on the surface. A simple shape index that utilises the circle as a unit of measurement has been proposed by Hammond and McCullagh (1978, p. 69). The compaction index (C.I.) is given as:

$$C.I. = \frac{P_a}{P_A}$$

where P_a is the area of the plot being measured and P_A is the area of the smallest inscribing circle. A circular plot has a C.I. of 1 which, therefore, indicates maximum compaction (a square has a C.I. value of 0.73 and an equilateral triangle 0.29). The less compact the plot the lower the value of C.I. which has a minimum value of zero.

Other pattern features of plots which can be measured include intri-

cacy (the amount of 'detail' in plot boundaries as indicated, for example, by the number of angles per parcel or the ratio between the perimeter and the circumference of a circle having the same area as the plot) and orientation (the direction of the 'graining' of the plot pattern). Some techniques for assessing these parameters are dealt with by Board (1970), Haggett and Board (1964) and Latham (1964).

It is clear that none of the methods described so far is completely satisfactory since they concentrate on one or two elements of the functional farm structure, such as distance between plots or the number of plots, and ignore others such as shape. Similarly, while such measures have recognised the importance of plot and holding sizes as weighting factors, they have neglected the significance of land quality in any functional analysis. For example, land of a high quality but located at a great distance from the farmstead may still be intensively cultivated. Binns (1950, p. 27) has argued that any comparative assessment between the situation before and after land consolidation should be weighted by land values, particularly since land values tend to increase after consolidation. Determining the value of agricultural land is no easy task. Market value is the most often used criterion, but data may not always be available and market price does not fully reflect aesthetic, social or psychological utility that the land may possess for its owner.

2.2.3. An Index of Holding Structure

In an attempt to overcome some of these difficulties, an index of holding structure has been developed. This index (H_s) is an adaptation of Simmons' (1964) index of farm fragmentation and Schmook's (1976) coefficient of weighted mean distance. The H_s index incorporates the elements of plot size, plot dispersion, plot shape, mean distance between plots and variations between plots in land quality. The index is independent of farm size and, therefore, has comparative utility for an analysis of holding structure before and after consolidation. Moreover, the individual elements

within the index can be isolated and examined and their relative contribution to a change in holding structure after consolidation can be evaluated. The index is given by the formula:

$$H_s = \frac{\sum \left(\frac{\frac{c}{b} \cdot t}{d} \right)}{\left(\sum \frac{\frac{c}{b} \cdot t}{d} \right)}$$

where c is the market value of the plot weighted by the size of the plot, b is the size of the plot, t is the shape of the plot (calculated using the compaction index outlined earlier) and d is the mean distance between plots and the farmstead (where possible this should be calculated along existing routeways). The index, therefore, is a measure of the relative consolidation of a holding, or the concentration of plots and plot sizes weighted by the spatial separation of plots, their individual shape and their value. The index has a maximum value of 1 indicating a consolidated and compact holding structure. Values tending towards zero have a less compact and more fragmented ownership pattern. The index may be used to describe an existing farm structure, natural changes over time or the effects of specific policy attempts at structural change.

The index is operationalized through a simple computer program written in BASIC, which allows the rapid computation of indices for a large number of holdings. It will be used later in this thesis to measure the holding structure changes produced by the land consolidation policy in Cyprus.

2.3. THE ECONOMIC AND SOCIAL APPROACH

Evaluation studies of land consolidation schemes have tended to concentrate on the economic effects, ignoring social factors. Moreover, such studies have usually adopted ad hoc methods of enquiry and have generally failed to justify their methodology in terms of any existing economic or social theory. This section, therefore, examines firstly certain theore-

tical economic and social considerations on consolidation and relates these to empirical observations. Secondly, it outlines some areas for further investigation.

2.3.1. Distance and Economic Considerations

In economic terms the analysis of land consolidation concerns the possible theoretical effects on farming operations of a change in farm structure. These primarily revolve around three spatial changes: the reduction of distances between plots and between plots and the farmstead; the increase in plot and holding size; and the rationalization of plot shape.

Distance is a spatial element that has long interested economic geographers. In agriculture distance has two important effects on farming operations. On the one hand, when a holding is split up into several fragments which lie at various distances from the dwelling problems arise from the general loss of time, cost of fencing and supervision and the inability to use machinery properly. On the other hand, there is the effect of distance on the way that each plot of land is used.

Much of the credit for originally formulating the principles relating distance to rural land-use is given to Johann Heinrich Von Thunen (Hall, 1966). He demonstrated the tendency for economic rent to decline for a given land-use as the distance and hence transport cost to market increased. Although Von Thunen's analysis was based on large market centres, his model is applicable at the micro-scale to the individual farm unit which serves as the first link in the marketing chain. Von Thunen himself was interested in this aspect and his interest in the effect of distances between a farmer's home and his fields has been discussed in detail by Chisholm (1979).

Von Thunen argued that the farmer knows the price of any particular product at his own farm gate (the market price less the cost of transporting the commodity to market). He assumed that the farm building formed the centre of operations from the farm. Fields which lie far away from these

buildings incur higher costs of operation than do those nearer plots, on account of the greater amount of time spent travelling to and from. As Chisholm (1979, p. 23) notes: 'If the distance is sufficiently great there will be no profit in cultivating a particular crop on the more distant lands; at a certain distance from the farmstead the cultivation of that crop will cease. Alternatively, the returns to be had from some other crop will, at a particular distance from the farmstead, become greater: it might be that potatoes are grown on the hither fields and wheat on the further ones'. At the same time the intensity with which each crop is grown will decline as the distance from the farmstead increases. According to Von Thunen the farm structure will vary spatially with a hypothetical zoning of land-use away from the farmstead.

Von Thunen assumed that all factors (prices, yields, etc.) were constant except for the cost of transporting the product to the farm. He demonstrated that the net revenue obtained for any product when transport costs are included declines with increasing distance of the field from the farm. If land-use intensity remains constant everywhere then it may be concluded that economic rent declines linearly with distance. This relationship may be described by the equation:

$$E = (p - c - td)Y$$

where E is the economic rent per unit area, p is the price per unit product, c is the cost per unit product excluding transport costs, t is the transport cost per unit distance, d is the distance to market and Y is the yield per unit area. The specific shape of the rent-distance function depends on the production functions involved and on any variation in per unit distance transport rates. When several land-uses are involved each will give rise to a characteristic rent-distance function which may lead to the substitution of one land use for another as distance from the farm varies.

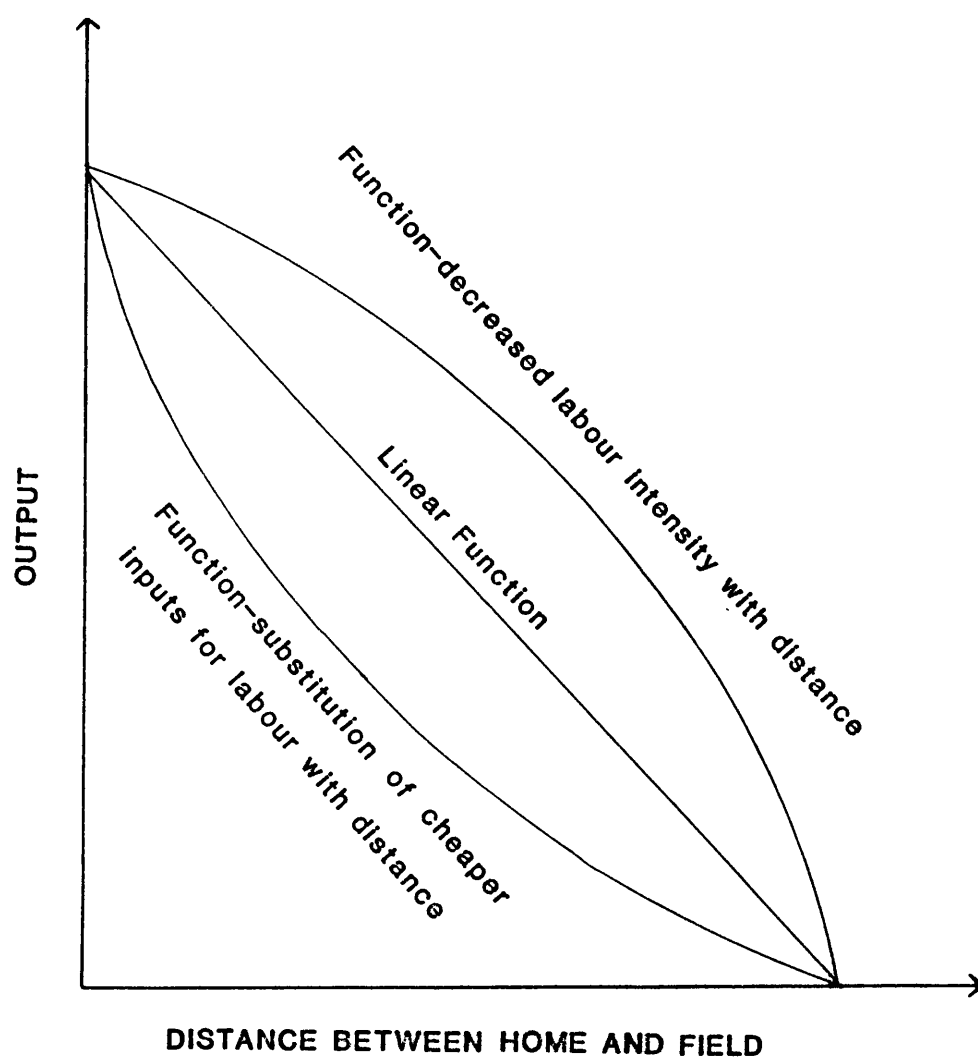
As the distance from the farmstead increases so, too, does the travel time between the field and the home. The effect is to increase the diffi-

culty of providing standard amounts of human labour. This can be interpreted as increasing the cost of labour, since the time consumed in commuting gives rise to an added cost in production. If it is assumed that the farmer behaves in a rational fashion, he will be interested in conducting his holding so that the cost of the last unit of labour equals the value of the additional produce that will result from it. If it is further assumed that the cost of labour increases constantly with distance then it may be expected that land-use intensity will decline as optimum inputs of labour decline with distance. The result will be a decline in output with distance (either of the same crop or by substituting a less demanding crop) which tends to be concave from the origin of the graph (see Figure 2.2). But this assumes that the input levels of other production factors will remain constant, and this is unlikely: some factor substitution may be expected. Chisholm (1979, Ch. 3) has shown that in many areas production decay functions occur which are convex towards the origin (Figure 2.2).

The slope of the decay function depends on the type of land-use - specifically the extent to which production is dependent on labour. It also depends on the time required for commuting standard distances, which is closely related to types of transportation. In areas where farmers walk to dispersed fields there will be significant distance effects on land-use. If fast transportation is used there may be little effect, except when very long distances are involved.

Chisholm (1979, pp. 45 - 67) has compiled a great deal of evidence to show that the theoretical observations described above are, to a large extent, verified by actual farming operations. For example, in Germany it was discovered that the amount of manure used in field fertilization dropped off considerably after about one hour's travelling time. Three Finnish studies (summarized in Table 2.1) shed light on the influence of distance on gross and net output. The first study indicated that, as the average distance of fields from the farmstead increases, the net product declines much

FIGURE 2.2 GRAPH OF AGRICULTURAL OUTPUT AND DISTANCE FROM FARMSTEAD



SOURCE: Found(1971,p72)

TABLE 2.1

RELATION BETWEEN PRODUCTION PER HECTARE AND DISTANCE TO FARM
PLOTS: THREE FINNISH EXAMPLES

Distance (kms.)	Study 1		Study 2		Study 3
	Gross Output	Net Output	Gross Output	Net Output	Net Output
0.5	92	78	89	67	83
1.0	84	56	80	50	68
1.5	77	34	73	40	56
2.0	66	13	67	33	46
3.0			57	25	32
4.0			50	20	
5.0			44	17	

Note: 0-0.1 km = 100

Source: Chisholm (1979, p. 41)

more rapidly than the gross output because the level of costs actually incurred diminishes less swiftly than the levels of gross product. For a distance of one kilometre the gross return falls on average by 16% and the net return by 44%. At two kilometres the net return per hectare is very small. However, data from the two other studies (Table 2.1) indicate that the rapidity with which the net product declines diminishes with distance. This is to be expected to the extent that land near the farmstead receives considerable inputs so that a large proportion of gross yield is attributable to factors other than inherent fertility of the soil, while land further away attracts fewer inputs and an increasing proportion of the total yield arises from the natural capacity of the land, until the point is reached where - even with a minimum amount of care - some level of production would be maintained. The rate of fall-off of production may also depend on the crop type. Data from the Netherlands show that in grassland areas the labour input falls by 50% when plots are 5 km. away from the farmstead, while in arable areas labour input drops by 50% around the 3 - 4 km. mark (Chisholm, 1979, p. 40).

Most of the data discussed so far have come from North-west Europe where there is an established tradition of farming surveys of this kind. Nevertheless, some studies are available from Third World countries too and these show similar results. In fact in many of these countries the problems of distance may be more acutely felt because of low levels of motorized transport. A study by Khan (1955) in Pakistan has shown that the cost of ploughing increased by 5.3% for every 500 metres distance from the farm and the cost of transport of manure and crops increased by 15% to 32% for the same increment of distance. The total cost of cultivating land rose by 20% for every kilometre, reducing the net product per hectare by the same amount. Richardson's (1974) study of rice cultivation in Guyana found rates of output decline very similar to the Finnish studies quoted in Table 2.1. In Guyana, the sharp fall in labour input can be partly explained by the mixture of technologies employed in rice cultivation. Hand methods prevailed

near the farmstead while mechanization characterised the more distant plots. In an Indian study Blaikie (1971) estimated the total labour requirements for various crops in four villages. Because of the spatial zoning of these crops there was a regular fall in labour input until the 6 km. limit was reached at the edge of a village's lands.

While empirical studies attempting to examine the influence of plot shape on farming operations do not exist, attempts have been made to theorise on these relationships. Wheeler (1973, p. 52) has argued that a rectangular shaped plot is more efficient than a square one in terms of the cumulative distance that must be travelled in an idealised pattern where the farmstead is centrally located. Lee and Sallee (1974) have looked at the effects of plot shape on linear field operations like ploughing and mechanical harvesting.

Adjustments to the problems of distance, size and shape revolve around decisions at two levels. At the farm level the same product may be grown in distant fields but less intensively or there may be product substitution on the basis of different levels of labour required. At the institutional level such problems may be tackled by government intervention through programmes of land consolidation. By its very nature consolidation reduces distances between plots and distances from farmstead to parcels of land; it increases plot sizes and rationalizes field shape. Theoretically the adjustments at this level should result in a number of changes in the way the farm operates. Field output and productivity should increase as reduced distances allow greater use of inputs, particularly labour. Reduction in transport costs may result in a change in land-use and the cultivation of more intensive crops. Economies of scale may now be possible on the larger plots and holdings. Rationalization of plot shape may allow more efficient use of machines. Farm incomes should rise and the general standard of living of the farm operator should improve. The limited empirical evidence available from the study of existing consolidation schemes confirms some of these

postulated effects, as the next section of this chapter shows.

2.3.2. Economic Results of Land Consolidation

Many of the case studies of economic results of consolidation schemes in English come from India. In all cases such schemes have resulted in a reduction in the number of plots accompanied by an increase in plot and holding size and rationalization of plot shape. In an early study Sreeraman (1966) demonstrated that consolidation operations have resulted in considerable reductions in labour inputs and also in the cost of these inputs (see Table 2.2). He noted that economies of scale after consolidation were particularly evident in paddy areas. Another Indian researcher, using a sample of five villages from a consolidated area and five from a fragmented area as a control group, was able to show that labour inputs were lower in consolidated areas and production levels much higher (Agrawal, 1971, Ch. 2). In Uttar Pradesh an attempt was made to evaluate the economic success of the consolidation process by comparing levels of farm investment against the cost of the operation (Elder, 1962). Costs in one village amounted to U.S. \$500 but they acted as a catalyst for U.S. \$4,000 of local investment. Another Indian study found that increased productivity, investment, savings in transport costs and labour inputs resulted in increases in farm incomes of up to 25% without any change in the technique of cultivation (Tiwari, 1970).

In Europe Jacoby (1959, pp. 37 - 40) has noted similar results. In Austria gross yields of farms rose by 18 - 40% with an increase in net production as a whole of 25%. This improvement was achieved with a 14% reduction in the labour force. Swiss consolidation schemes have recorded increases of 20 - 30% in agricultural output; farmers also became more market orientated as products consumed on the farm fell by 6% (Table 2.3 gives a detailed example). In West Germany the effects have been no less spectacular. Land consolidation has seen an intensification of the operational organization of the farm with increases in the production of root crops and the

TABLE 2.2

INPUTS AND COSTS BEFORE AND AFTER CONSOLIDATION
IN AN INDIAN VILLAGE

	Man-Days		Bullock-Days		Cost (rupees)	
	Before	After	Before	After	Before	After
Ploughing	120	100	120	100	1,000	800
Manuring	30	30	10	20	300	300
Sowing	15	10	10	5	100	75
Irrigation	20	15	20	15	120	100
Weeding	20	15			80	60
Harvesting	20	15			300	200
Threshing	20	15	20	12	200	175
Other	60	10	60		100	20
Totals	305	210	240	152	2,200	1,730

Source: Sreeraman (1966).

TABLE 2.3

ECONOMIC EFFECTS OF CONSOLIDATION IN MONDACH VILLAGE,
SWITZERLAND

Economic Indicator	Before Consolidation		After Consolidation	
	Total	Per ha.	Total	Per ha.
Capital Assets	2,229,340	5,929	2,454,110	6,450
Gross Output	321,481	855	332,288	884
Produce Consumed on Farm	92,242	32%	77,579	26%
Market Production	194,309	68%	216,342	74%
Operating Expenditure	298,288	793	224,992	731
Net Yield	23,193	62	57,296	152
Net Yield % Capital	1.04%		2.36%	
Production Costs	394,893	1,050	363,924	967
General Income	204,347	543	217,436	578
Agricultural Income	139,778	372	155,946	415
Labour Income	75,570		98,929	
Property Income	16,243		22,916	

Note: All figures except percentages are in Swiss francs.

Source: After Jacoby (1959, p. 43).

introduction of cash crops. In France land consolidation has resulted in a reduction of farm costs by 30%, an increase in production of 15% and in increase in rental values of 40% (Roche, 1963, p. 536). In Italy some of the more advanced consolidated farms were able to increase their productive potential by as much as 50%, mostly through increasing crop specialization (Cesarini, 1977). In Spain Naylor (1959) has shown that the numbers of tractors after land consolidation in the Cantalapiedra scheme rose from 3 to 32 and the number of steel ploughs from 3 to 114. Land values and output also rose by 35% and 25% respectively. Labour costs decreased by 20% while employment opportunities for casual labour increased. Finally, in the Netherlands the EEC has carried out cost-benefit analyses of three land consolidation schemes (OECD, 1972). The results show a marked increase in gross output and considerable savings in labour.

2.3.3. Social Considerations

While economic factors are important in an evaluation of land consolidation it must not be forgotten that farms function within more general social systems. Thus an understanding of this social system should be incorporated into any study of agriculture (Gasson, 1973, p.529). Agricultural economists have been slow to approach other behavioural sciences. Sociology, concerned with the social interaction amongst persons, offers complementary insights into human behaviour in rural life. Sociology can also provide a more informed basis for the simplifying assumptions the economist makes about social structures and human motivation, and helps to account for non-economic variations in human behaviour.

A study of the literature reveals a significant lack of knowledge on the effect of land fragmentation on rural social systems. While writers have been anxious to show that fragmentation is often a result of the operation of such social systems they have usually made only very general remarks about the social effects of fragmentation and have ignored the important social adjustments made to accommodate a state of fragmentation.

There are reasons for this. Firstly, measurable data on social change are not easily obtained. In some cases the information required may be of a sensitive nature. Secondly, problems arise over the actual definition of social change and its objective identification at the individual or group level. That land consolidation does have a social impact has occasionally been noted in the literature. One case study by Elder (1962) examined the social impact of a consolidation scheme in India. He concluded that the lower castes were not in a position to take advantage of consolidation and that, in some cases, the process created a stronger polarization of society. Other writers in India have also recognised this, arguing that it is only the larger land owners who have really benefited from consolidation (Mavlankar, 1971; Singh, 1978; Sreeraman, 1966; Trivedi & Trivedi, 1973). In Germany, although all farmers affected by land consolidation showed some benefits, individual cases varied enormously in their increased standards of living (Jacoby, 1959, p. 38).

Some work, not specifically on land consolidation, has attempted to show the importance of social factors in agricultural change. In many rural communities change is avoided or even resisted and, if conservative attitudes prevail, an individual may be unprepared to innovate for innovation involves risking not only capital and profits but also status and respect. Indeed, the whole farm environment may tend to militate against change. Gasson (1969, p. 284) has noted this effect on the occupational immobility of small farmers, commenting that, 'as a broad generalization, it appears that small farmers who could move out of farming will not, whilst those who would move cannot'. Important social factors such as age, education, stage in the life cycle, attitudes to farming, farm modernization and extension services may all be important factors here. More specifically, two studies examining the influence of socio-personal factors, along with other economic measures, have attempted to evaluate their influence on attitudes to land consolidation. In Eastern Flanders, Evaraet (1973) used a highly structured questionnaire to obtain measures of 13 variables that he

considered might be significantly related to attitudes towards land consolidation. A similar piece of work in Canada identified a number of social characteristics influencing attitudes and ability to respond to the consolidation process. These included age, education, attitudes to leaving farming, farm modernization and expectations as to the future of farming (Zimmer & Rodd, 1971).

From a consideration of the literature two main areas of interest in the social field exist for a study of land consolidation: firstly, the role that social factors can play in the acceptance, or otherwise, of the land consolidation process and in the ability to respond positively to changes in farm structures; secondly, the impact that land consolidation may have on social behaviour and existing social structures.

2.3.4. Identification Areas for Further Investigation

The discussion in the preceding sections has outlined a number of areas of interest in an evaluative study of the economic and social effects of land consolidation. More specifically, an investigation should consider the following research areas:

- 1) attempts should be made to identify changes in travelling time and labour input after the implementation of land consolidation. This will allow an interpretation of the distance-reducing effect and is extremely important because data relating to labour and economic factors provide the key to the development of farms after the re-organization of land ownership;
- 2) changes in gross and net incomes per holder and per unit area must be investigated in order to evaluate the effect of distance reduction and plot enlargement;
- 3) examination of changes in mechanization, fertilizer use, irrigation and other inputs should be carried

out so that the impact of changes in plot size and plot shape can be determined. These are important considerations because they may help to explain economic changes that are not directly related to the distance function;

- 4) consideration of the settlement pattern will determine if the process has had any effect on farmstead development or relocation and what effect this spatial movement has on the economic factors outlined above;
- 5) changes in land-use must be considered and analysed in the context of spatial variations in levels of production and crop specialization;
- 6) the social and personal characteristics of farmers affected by the consolidation process must be determined and linked to variations in the ability to respond to the farm re-organization and the capacity for change;
- 7) social and behavioural indicators must be identified and examined in order to evaluate the impact of consolidation. Such social indicators might include farm operator status, standard of living, standard of social fabric (including health, housing, education and amenities), social attitudes and family relations;
- 8) examination of the role of the land consolidation process as an educative tool is important, particularly in its ability to create a more modern and commercial outlook in the mind of the farmer;
- 9) various methodological weaknesses apparent in previous work must be resolved, including problems of the scale and scope of analysis. Too often past

studies have concentrated on a few small groups or have been spatially restricted to just one village, thereby failing to examine consolidation's overall impact and its spatial variations. This may be achieved by examining representative samples of farmers and schemes from different physical environments.

Future research must also consider social and economic effects at both ownership and operational levels.

In the context of these considerations a number of variables has been selected for investigation and analysis in the present study. These are listed in Table 2.4.

2.4. THE BEHAVIOURAL APPROACH

When evaluation studies of land consolidation schemes have been undertaken behavioural considerations have generally been overlooked. Several pieces of research have attempted to link attitudes towards land consolidation with socio-economic characteristics but their methodologies and results are rather weak (Everaet, 1974; Zimmer & Rodd, 1971). Yet in theory a behavioural perspective on land consolidation should allow both a more detailed and a clearer picture of the effects of the consolidation process to emerge.

2.4.1. A Note on the Emergence of Behavioural Studies in Geography

The behavioural approach had its origins with the development of Gestalt psychology in the 1920s and 1930s. Clark (1950) then identified the importance to geography of the mental image that man holds of reality. This idea was to emerge subsequently in Boulding's (1956) statement that 'it is the image which in fact determines what might be called the current behaviour of any organism or organization'. However, it was not until 1963 that the first attempt in geography was made to establish the dichotomy between the real world environment and the individual's image (Kirk, 1963). This was done by

TABLE 2.4ECONOMIC AND SOCIAL VARIABLES UNDER INVESTIGATION IN THIS STUDY

ECONOMIC

Travelling time to plots
Working time in plots
Farm incomes (per unit area)
Farm costs (per unit area)
Land-use
Crop types
Livestock types
Farm inputs: mechanization, irrigation etc.

SOCIAL

Age
Education
Stage-in-the-life-cycle
Farmer typology
Spatial mobility
Family data
Possessions
Attitudes to farm modernization
Attitudes to retirement
Attitudes to extension
Attitudes to children farming
Attitudes to group farming

splitting geography into the 'phenomenal environment' of physical facts and the 'behavioural environment' which Wood (1970, p. 130) defined as 'a psycho-physical field arranging the phenomenal environment into structures with different cultural values'. Kirk (1963) argued that the social and physical facts of the phenomenal environment constitute parts of the behavioural environment of a decision-taker only after they have passed through a highly selective cultural filter of values. Kirk saw the behavioural environment as the one in which 'rational human behaviour' began and where decisions were taken.

Throughout the 1960s, as the empirical content of behavioural geography grew, an increasing number of workers concentrated on attempts to provide a coherent theoretical base for the subject. Attempts were made to provide a systems theory model in which the behavioural environment could be studied (Brookfield, 1969, p. 53). Downs (1968) suggested a research strategy based on three approaches: structural, evaluative and preference. Later Downs and Stea (1970, pp. 3 - 12) proposed a systems-based approach for the study of the image. More recent contributions to the subject of behavioural geography stress the problems of measurement and also the need for an inter-disciplinary approach if research is to be executed thoroughly. Bunting and Guelke (1979) have pointed out that the 'style' of behavioural investigation has tended to concentrate on the image rather than on trying to understand behaviour. One possible solution is to work backwards, by observing overt behaviour and then examining attitudes and preferences (Sitwell & Latham, 1979). On the other hand, under the radical critique, behavioural geography is seen as an outgrowth of positivism, lacking in utility and neglecting the main processes within society at a given time by concentrating on detailed individual studies (Hudson, 1980, p. 356; Rieser, 1977).

Underlying the subject of behavioural geography is the basic postulate that human spatial behaviour is dependent on the environment as perceived by the individual. The term 'perception of the environment' can be

used in two senses. It can refer to the process by which an individual receives stimuli from the environment through his senses and stores them in his brain. Or it can refer to the model of the environment which is built up over time in the individual's brain. In spatial terms this model is the 'image' and is termed the mental or cognitive map. This abstraction is justified by the empirically based assumption that individuals behave as if such maps existed, in spite of the fact that these maps represent unknown physiological and psychological quantities.

A number of workers have presented schemata which conceptually relate perception and behaviour (Downs, 1968). Although the details vary, the main feature seems to be a linking of perception and behaviour in a cyclical process. In this cycle the individual receives information through his sense organs. Some of this information is stored in the mental model of the environment; when a person is motivated to act in some way, this perceived environment is consulted and a decision as to the most appropriate course of action taken. The decision is then translated into overt behaviour subject to a person's ability to realise his ambitions.

2.4.2. Perception Studies and Agricultural Geography

In agricultural geography the decision-making environment is extremely complex. Tarrant (1974) recognises three possible approaches. The first assumes that the physical environment controls agricultural decision-making. The second can be called economic determinism, whereby uniform producers react in a uniform and rational manner to economic circumstances. The third recognises a further set of influences on agricultural decision making which are not based on economic or physical environmental factors; these influences include the values of individual farmers and their aims, attitudes and perceptions, all of which are important in the final spatial structure of agriculture.

Perception is important in the decision-making process to the extent that it influences the learning process whereby the images of the decision-

making environment are determined. Learning in a land-use setting occurs in response to two types of information: knowledge gained through the experience of the individual himself; and knowledge obtained from exogenous sources through communication with others. For example, in an evaluation of land consolidation, the response to the process of consolidation in terms of overt behaviour can be partly explained by reference to the image of consolidation and to the learning process from which that image was derived. While no actual research on this aspect of land consolidation exists, general knowledge about farmers' perceptions indicates that this is not entirely speculative or theoretical. A number of empirical studies of human perceptions of natural hazards have been undertaken (e.g. Burton & Kates, 1964; Saarinen, 1966). Variations in human perceptions of the probability of the occurrence of hazards have been revealed and studies have demonstrated that human perception of hazard is a function of personality and culture (Tuan, 1967, pp. 4 - 17).

Identification of the perceived image alone is insufficient without relating it to other factors. Much work has been done to demonstrate that goals and values play an important underlying role in rural behaviour (Bowler, 1975; Gasson, 1973 & 1974; Ilbery, 1975; Van der Vliet, 1972 & 1974). Dalton (1967) devised a broad three-fold classification of farmers' goals: 'physical well-being' or the need to provide for present and future requirements, whether it be in terms of food production or the accumulation of wealth; 'social recognition' or the achievement of status, respect or even power within a particular community or group; and 'ideological motives' which include patriotism, the idea of duty and parental and family responsibilities. Gasson (1973, p. 527) on the other hand has classified farming values under four headings: 'instrumental', which implies that farming is viewed as a means of obtaining income and security with pleasant working conditions; 'social', which implies that farming is an activity followed for the sake of interpersonal relationships in work; 'expressive', which suggests that farming is a means of self-expression or personal fulfilment; and 'in-

trinsic', where farming is valued as an activity 'in its own right'. These classifications are useful potential frameworks for the present study, except that it is land ownership, rather than farming activity, which is the important element in the Cypriot case.

The availability and use of information are key factors in the perception process and this is especially the case with an officially-promoted policy like land consolidation. It is important here to distinguish between the 'awareness' of information on the part of the individual and its 'use'. While these two stages may in practice be synonymous, particularly since the farmer will not begin a search procedure unless he plans to use the information obtained, any farmer will inevitably acquire 'redundant' information from his day-to-day activities. This distinction is significant as the description of innovation diffusion, for example, is dependent upon 'use' rather than 'awareness' of information. Both the amount and quality of information - quality being defined as the level of confidence placed in it by the receiver - affect its acceptance and use.

Information sources may be classified into two groups (Morgan & Munton, 1971, p. 34): sources external to the agricultural society, i.e. advisory services, research centres and mass media sources; and sources within the agricultural society based on inter-farmer personal contact. Information obtained from sources external to the agricultural society is usually treated with greater suspicion by farmers than the information they receive from other farmers. It was, for instance, demonstrated by Hagerstrand (1953) that personal contact between farmers is a useful basic assumption in the simulation of innovation diffusion. However, the first group of sources often provides the 'awareness' if not the acceptance or use of information.

Acceptance of information depends not only on its source but also on its content, particularly its 'newness'. If the idea merely extends an existing technique or if the farmer has experience of an allied system of

production he is less likely to reject it than if the concept is totally new. Similarly he is likely to require less information about it before he accepts it. At the same time, the farmer's personal characteristics, education and outlook influence the way he searches for, and acts upon, information received. Elderly farmers who have lost their mental and physical drive will be generally less prepared to take risks than their younger, more highly educated and energetic counterparts. The degree of contact with urban life may also be an important factor in generating an open-minded attitude towards new ideas. Pred (1967 & 1969) has attempted to systematize the role of information in decision-making through the construction of a 'behavioural matrix', although the interdependence of the axes in his matrix means that it is difficult to place within it each decision-maker.

Linking the above remarks on rural behavioural geography to our study of land consolidation, four areas for further research can be identified. The first of these is the identification and measurement of the perceived image of land consolidation. This may help to explain variations in response to the land consolidation process itself. Moreover, since actual behaviour is easily measured the link between the image and behaviour can be more easily explored. Similarly, changes in attitude towards general and specific farming operations must be identified if the general effects of the consolidation process are to be understood. Secondly, research must consider the underlying goals and value systems of the individuals within the society under study. These features may help to explain both the response to, and perception of, the consolidation process. Thirdly, the availability and use of information sources should be explored and linked to the perceived image. Finally, socio-economic characteristics of respondents should be linked to the perceived image, goals and values and the learning process.

2.4.3. The Problem of Measurement

The problem of attitude and image measurement is a critical area in much behavioural work. Sarre (1977) maintains that many studies have used 'ad hoc' methods designed to tackle narrowly conceived problems without reference to other methods and often without reference to work by psychologists on relevant mental processes. Problems of limiting response and researcher bias have come to dominate measurement difficulties and a variety of techniques have been experimented with in an attempt to overcome these. A major problem in this study's research design, therefore, was to find an appropriate way of quantifying farmers' responses. The psychological literature presents a number of scaling methods which have been used to measure respondents' attitudes to a wide variety of stimuli and which initially appeared to be potentially suitable for this approach. However, closer analysis revealed that not all these scales were appropriate. Furthermore, environmental and logistical constraints imposed restrictions on the type of technique that could be used in the field. Seven major types of attitude scale were examined to find the most suitable.

The first of these, the so-called 'rating scale', is the simplest. Here a respondent is asked to place his attitude along a spectrum, usually with five or seven categories. These scales are simple to operate in the field and are more sensitive than a simple 'Yes/No' answer. However, they only measure a single item and therefore tend to be unreliable (Moser & Kalton, 1971). They are particularly unsuited to responses involving complex or emotional topics.

Alternatively, Thurstone scaling involves the use of a large number of attitude statements which relate to the problem being studied and which vary from one extreme of favourableness to another (Thurstone, 1928). The statements are written onto cards and are given to a panel of judges who are asked to group the statement piles according to the neutrality, or extremeness, of each attitude expressed. The statements which have a high scatter

between judges are discarded and those to be used in the questionnaire are selected from the remainder. The respondents are then asked to answer the selected statements which are positioned in random order in the questionnaire. The method has two major disadvantages: it is laborious and time-consuming; and the panel of judges may view things differently from the respondents used in the main survey.

The Guttman scaling method is based on the assumption that a set of items can be ordered along a continuum of difficulty, the order being reflected by the relative infrequency with which each item is endorsed (Guttman, 1950). The method is cumulative in that acceptance of one item implies acceptance of all other items of lesser magnitude. Guttman scaling can, however, be criticised for its analytical complexity and its deterministic nature. Because of these it is unsuitable for this study.

Semantic differential scales consist of a number of bi-polar rating scales with each extreme defined by an adjective such as 'Good/Bad' or 'Easy/Difficult' (Osgood et al, 1957). The respondent has to consider each pair of adjectives and place his position on the scale between two extremes. The scale is conventionally divided into seven and the respondents' scores are then added to give a total score. In an attempt to avoid bias the position of the positive end of the scale is randomised. This method has been successfully used by researchers in the past (Burton & Golant, 1970; Lowenthal & Riel, 1972; Sonnenfield, 1969). While this method does have considerable potential problems of adjective selection meant that it, too, had to be excluded from this research.

Fifthly, Likert scales attempt to measure respondents' attitudes to a series of statements (Likert, 1932). Usually the responses are scored along a five-point scale ranging from 'strongly agree' to 'strongly disagree'. In some studies seven categories have been used but Oppenheim (1966) suggests that this larger division has shown little benefit. Likert scales are easier to construct than Thurstone scales and give a reasonable ordinal

measurement (Moser & Kalton, 1970). In his work in medical care Phillips (1979) found the scale to be robust and practical. The scales are quick to use in the field although some time must be taken to construct an 'item pool' from which relevant statements can be selected. The advantages of this technique meant that it was potentially suitable for this study.

Point score analysis is a more recent attempt to develop an attitude measurement scale (Ilbery, 1975, 1977a & 1978; Van der Vliet, 1972 & 1974). Its properties are similar to those of the Likert scale outlined above. The point score method asks respondents to say whether, in their opinion, each factor in a pre-selected list is in general relevant. They are then asked to score this level of relevancy along a four-point scale from 'not really important' to 'essential'. Despite the relative subjectivity of the method the main advantage of categorizing the degree of importance of each factor is that the answers can be coded in one of a number of groups allowing further statistical analysis. The scale has been successfully used in an agricultural setting (Ilbery, 1975) and has an advantage over the Likert scale because pre-determined factors may be used. This also appeared to be a potentially suitable technique.

Repertory grids, the last measurement scale to be considered, are a technique devised to establish how individuals see the part of the world in which the researcher is interested in their own terms. The method operationalizes a 'Theory of Personal Constructs' developed by Kelly (1955). The theory assumes that people build up a mental representation of their environment and that this is vital to their behaviour. It is suggested that this representation takes the form of a large number of bi-polar constructs. The Repertory Grid Test is a way of eliciting the constructs that a person uses to discriminate among a set of elements and scores each element on each construct. While the grids presented to the respondent may resemble those of the semantic differential, the constructs used are different in that they are in some sense his own, not those devised by the investigator. Problems

of researcher bias are thus considerably reduced.

The technique of repertory grids has been adopted in geography after pioneering work carried out at the University of Bristol in the early 1970s. Sarre (1973) asked respondents to list places of importance in Bath and to say why they were important. A list was built up of elements and associated constructs and the respondent was next asked to scale the elements along the constructs. The respondent was then presented with a standard grid of elements and constructs and the process repeated. Harrison (1973) who was concerned with retailing in Bristol, used 27 elements and 8 constructs in his standard grid. Both Harrison and Sarre used a method of 'triad sorting' in their surveys, asking people to consider three randomly selected elements and to consider how two were similar and why the third was different. Free choice is given to respondents as to which elements and which constructs they select and, because of this, it is initially difficult to build up an average model since many elements and constructs appear only once. For example, in Sarre's (1973) work, of the 155 places mentioned by respondents 90 appeared only once and, of the 76 constructs mentioned, 43 appeared once and none appeared more than 9 times.

The repertory grid method is also extremely time-consuming and complex and probably most conveniently performed on a volunteer or captive population - for example, students or a school class. Harrison's (1973) questionnaires varied in interviewing time from 1 to 5½ hours and Sarre's (1973) from 2 to 4½ hours. An undesirable result of this length of interview is a very small number of respondents: Sarre's sample was only 20; Harrison's was 34. Hudson (1974) achieved a very biased sample of 68 self-selected students. A reduction in interview time, and thus an increase in sample size, has been made possible through the application of 'fixed grids' (Floyd, 1977; Townsend, 1977), although this does reintroduce problems of researcher bias (Hudson, 1980). While this measurement technique does have several difficulties, it was thought to be potentially valuable in this research on land consolidation.

From this preliminary examination of measurement techniques it was decided that three possible measurement scales could be potentially useful in an evaluative study of land consolidation: Likert scales, point-score analysis and repertory grids. The suitability of these scales in the field was tested in the pilot study described in Chapter 4.

C H A P T E R T H R E E

THE STUDY AREA : CYPRUS

3.1. CHOICE OF STUDY AREA

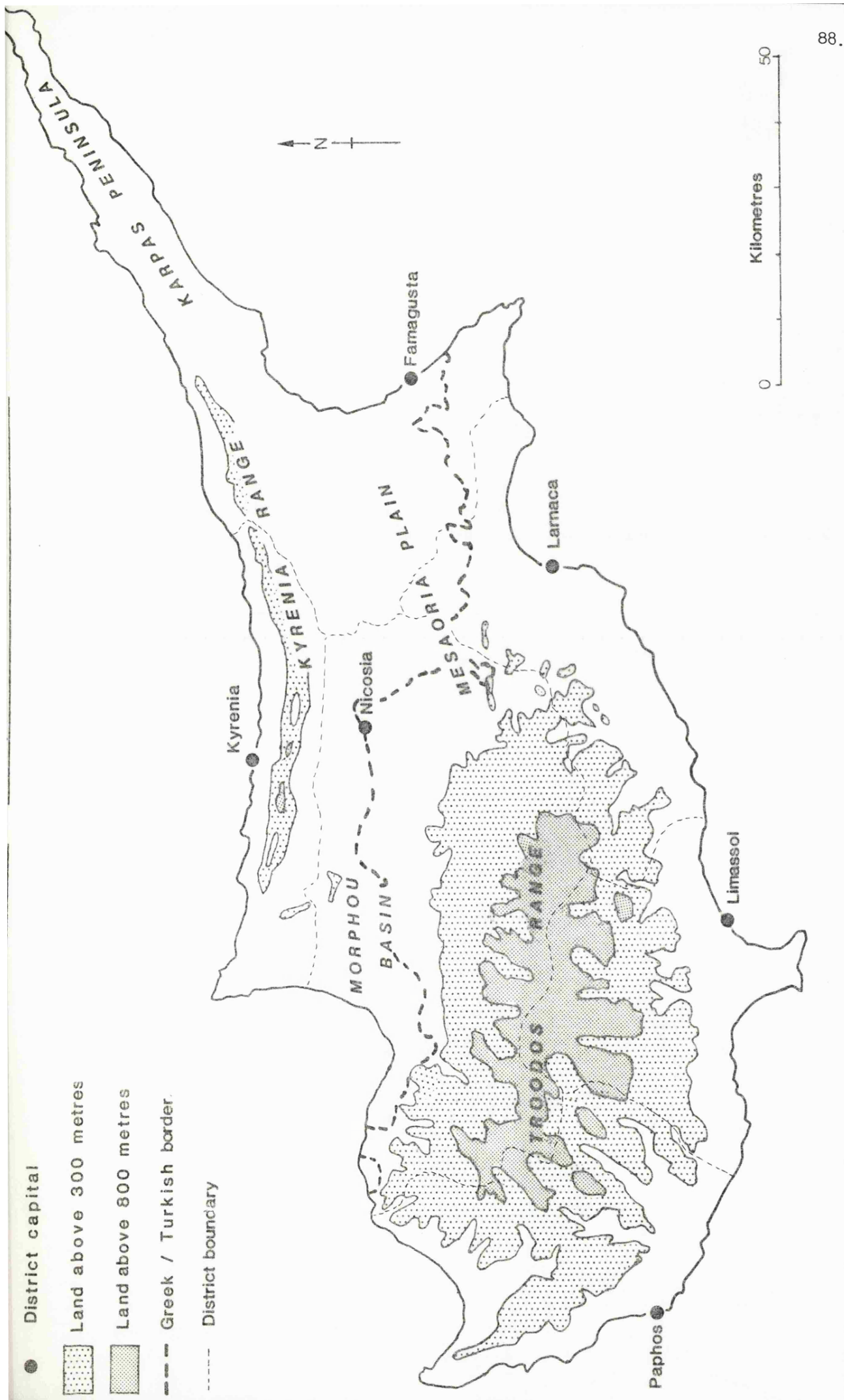
The island of Cyprus was selected as a suitable study area for several reasons. Firstly, and most importantly, there existed an active and on-going policy of land consolidation on which no proper evaluation studies had been attempted. Evaluative research could, therefore, prove a valuable contribution to future land consolidation operations on the island and possibly elsewhere. Secondly, a literature search revealed a considerable wealth of knowledge about land consolidation projects in developed countries of Europe but a paucity of work on projects in less developed areas, such as the Mediterranean. Thus scope existed in Cyprus for an original piece of research which could have relevance for other rural Mediterranean areas as well as for developing countries in other parts of the world. Thirdly, in other countries where land consolidation measures had been applied, usually at much earlier dates, such measures had become integrated into wider schemes of structural change. The problem of research in these areas then becomes one of isolating the effects of land consolidation from the many other elements. In the Cypriot case land consolidation was applied as a measure in its own right, although it was usually complemented by irrigation works. Fourthly, Cyprus is relatively

accessible. This facilitated an all-important pilot visit prior to the main period of field research. Finally, early investigations into the island's suitability revealed a wealth of 'raw' information, much of it in English, and also a strong desire from Cypriot official personnel for an evaluative research project to go ahead. At a later date this desire was translated into positive assistance and, at all subsequent stages of the project, official help was continually forthcoming.

3.2. GEOGRAPHICAL AND HISTORICAL BACKGROUND

The Republic of Cyprus (area: 9,251 km²) is the third largest island in the Mediterranean after Sicily and Sardinia. Its size is roughly equivalent to the combined area of the English counties of Norfolk and Suffolk. It lies between latitudes 34° 33' and 35° 34' North and between longitudes 32° 16' and 34° 37' East. Its nearest neighbours are Turkey, 71 km to the north, and Syria, 103 km to the west. The Greek mainland is some 800 km away.

The name of the island is obscure although some say it came from the copper that was mined there (Durrell, 1957, p. 30). Its strange shape has prompted many odd comparisons ranging from a 'pot with handle' to a 'stretched out deer skin' (see Figure 3.1). Its greatest length from east to west is 225 km and its maximum width from north to south is 97 km. In the north there is the narrow Kyrenia mountain range, whose highest point is 914 m. These limestone hills have a thin soil cover and a craggy, arid appearance. The Troodos Massif in the south-west is much larger and more imposing, rising to a highest point of 1950 m at Mt. Olympus. Durrell has described the Troodos as: "an unlovely jumble of crags and heavyweight rock, unarticulated and sprawling ... bald in many places, its great shoulders and arms thrusting out of the painfully afforested areas like limbs in a suit too small for them" (Durrell, 1957, p. 31). Between these two ranges lies a flat lowland, the broad fertile plain of Mesaoria,



extending from the east coast and ending in the west in the still more fertile Morphou Basin. In the south a coastal plain, of varying width, runs from Larnaca to Limassol and Paphos. The narrow coastal strip in the north is covered with olive and carob trees, backed by the steeply rising Kyrenia hills. There are no rivers with perennial flow. Two small salt lakes can be found in the south and south-east, near Limassol and Larnaca respectively.

Cyprus has a typical Mediterranean climate with a hot, dry summer from June to September and a mild, wet winter from November to March separated by short autumn and spring seasons. In high summer (July and August) mean daily temperatures are about 30°C in the central plain and 22°C in the Troodos mountains, with average maxima of 38°C and 28°C respectively. In January mean daily temperatures fall to 10°C in the central plain and 4°C in the higher parts of Troodos, with average minima of 5°C and 0°C respectively. Average annual rainfall is 500 mm. for the island as a whole although this varies considerably from year to year and, in winter months, snow falls on the northern slopes of Troodos. Once every ten years, on average, Cyprus faces a severe drought.

The soils of Cyprus bear the strong impact of the aridity of the climate and the diversity of the topography. Soil conditions range from rich 'terra-rossa' west of Nicosia and fertile grey alluvium near the large rivers to extensive, less fertile sediments found over much of the rest of the island. Soil fertility is, however, generally poor, a result of the widespread destruction of forests by man and his animals and the semi-arid climate. Soil alkalinity is high and organic content low.

3.2.1. History

Due to its geographical position Cyprus has long been regarded as a possession of great value, offering economic and political command of the eastern Mediterranean. Control of the island has passed, sometimes with

great rapidity, from one power to another (Newman, 1940). Successive owners have left their stamp upon the land and its people.

Early in the second millennium B.C. Greek-speaking Achaeans began to establish on the island colonies which later grew into city kingdoms. These early colonisers sought the rich wood and copper reserves, now largely exhausted. The Phoenecians also founded colonies and, by the eighth century B.C., the island was divided into Greek and Phoenecian kingdoms (Luke, 1965). Subsequently, it became a province of the Persian Empire and then passed to the Ptolemies of Egypt from 295 B.C. to 85 B.C., after which date the island became a part of the Roman Empire. Under the Romans the island prospered and trade flourished. In 330 A.D. the Roman Empire was divided into Eastern and Western parts and Cyprus became a province of the Eastern, or Byzantine, Empire. In 649 A.D. it was attacked by the Arabs and, for the next 300 years, was the object of dispute between Byzantines and Muslims.

Richard Coeur-de-Lion, on his way to the Holy Land during the Third Crusade, conquered Cyprus in 1191, passing it to Guy-de-Lusignan, the deposed King of Jerusalem, the following year. Under the Lusignan monarchs western feudal law was introduced and the Latin clergy dominated the Orthodox Church.

In 1571 Cyprus came under Turkish rulers who restored the independence of the Orthodox Church. Turkish soldiers settled on the island were given land and deliberately dispersed in groups to all the main towns and villages around the coast (Drury, 1972; Meyer, 1968). Cypriots suffered considerably under Turkish rule, particularly through excessive taxation (Jenness, 1962).

Under the Anglo-Turkish Convention of 1878 Cyprus was placed under British control and, in 1914, the island was annexed by Britain. British influence was limited to the development of an efficient judicial system

and an effective police force, with some improvements in agriculture, education and roads (Bellamy, 1903).

In the 1930s there developed a strong desire amongst the Greek Cypriots for independence, often coupled with demands for 'enosis', or union with Greece. Under the guidance of EOKA (National Organization of Cypriot Combatants) a campaign of terrorist activities against the British administrators was carried out and, in 1955, a State of Emergency was declared. British troop reinforcements arrived in an attempt to quell the revolt (Lee, 1973). At the same time, intercommunal clashes between Greek and Turkish communities became more frequent. Eventually a political solution was agreed upon and, in 1960, the State of Emergency ended with the election of Archbishop Makarios as the first President of the Republic of Cyprus. Britain, Greece and Turkey were to be guarantors of the island's independence and territorial integrity.

The post-independence period saw a continuation, rather than a decline, of intercommunal conflict centred on problems associated with the new constitution. In an attempt to control the violence a United Nations Peace-Keeping Force arrived on the island in 1964. Turkish Cypriots now began to insist upon local autonomy within a federal state while the Greeks were totally opposed to any partition. The inflexibility of both sides saw the eventual rise of extremist groups and, on the Greek side, a renewed call for enosis. The Makarios Government, committed to the independence of Cyprus, came under attack from this group and, in 1974, with aid from Greece, a successful coup was carried out. With the fear of enosis and the general state of political uncertainty in mind Turkey took the opportunity to invade Cyprus, landing a large force at Kyrenia. There was little resistance to the invading Turks and a wholesale evacuation ensued of resident Greek Cypriots from northern regions. The Turkish forces soon controlled 40% of the island and some 200,000 Greek Cypriot refugees moved south (King, 1980b). In the north a 'Turkish Federated State' has been established with

Turkish Cypriots now running what were once Greek Cypriot enterprises (King, 1979). Attempts to resolve this situation have made little progress and, as time passes, a divided Cyprus becomes for some a way of life and for others a necessity.

While a large part of the Cypriot population of 628,500 (1980) is concentrated in the four major towns of Nicosia (the capital), Limassol, Larnaca and Paphos, a significant proportion still lives in the 620 villages scattered throughout the island. Rather surprisingly, there exists a spatial concentration of villages in the harsher mountainous areas. Village settlement along the more fertile coastal plains is relatively sparse. Movement into highland areas came as a result of oppressive Turkish rule, the vulnerability to attack of most coastal sites, the need for an adequate supply of water and a wide range of soil types (Drury, 1972, p. 166).

3.2.2. The Economy

The economy of Cyprus has been closely bound to the fortunes and misfortunes of her neighbours. During early periods, when Mediterranean trade was at its height, Cyprus prospered but from the seventh century to the nineteenth century there was a general economic decline (Hald, 1968). The early twentieth century saw a transformation of traditional life with improved communications, a rise in the standard of living and an increase in real incomes. This 'boom' collapsed in 1957, with the reduction of British military spending and, in 1960, the Republic inherited a depressed economy whose prospects for economic development seemed far from promising.

In an effort to tackle the prevailing economic problems a series of Five-Year Development Plans was initiated with the aim of restructuring the economy by channelling increased investment into agriculture and industry and by undertaking necessary social and institutional reforms. Improvements were considerable and the economy grew with Gross National Pro-

duct per capita rising from £CY164 in 1960 to £CY542 in 1973.

This economic progress was brought to an abrupt end by the Turkish invasion. The loss of some of the richest agricultural lands and the most important tourist resorts created economic problems of immense proportions and the government suddenly had to assume responsibility for a large number of displaced persons after ten years of full employment (Patsalides, 1977). However, a series of two-year Emergency Economic Action Plans have guided the economy back to, and past, the pre-1974 position. This recovery, described by some as an economic miracle, has to a considerable extent been facilitated by external factors - high prices for Cypriot goods in foreign markets and the inflow of large amounts of foreign capital in the form of direct aid and development projects. At the present time, however, the economy is showing signs of suffering from the recession which has gripped Europe.

Historically, the Cypriot economy has been dominated by agriculture. In the modern economy, however, four sectors are significant: agriculture, manufacturing, construction and wholesale and retail (see Table 3.1). In recent years agriculture, in terms of its contribution to Gross National Product, has been overtaken by all the other sectors. However, as a supplier of raw materials for manufacturing and for the wholesale and retail trades its contribution is far from negligible. In terms of total employment of the active labour force, agriculture still plays a primary role even though numbers employed have fallen by nearly a half between 1960 and 1980, mostly as a result of rural-urban migration (see Table 3.2). Agriculture plays a particularly significant role in foreign trade and is an important contributor to domestic exports (see Table 3.3), although exports of consumer goods have shown a rapid growth since 1973.

The agricultural sector is distinguished by three main farming types: dryland farming, irrigated farming and animal husbandry.

TABLE 3.1CYPRUS: BREAKDOWN OF GROSS NATIONAL PRODUCT BY SECTOR (£CY MILLION)

	1960	1970	1980
Agriculture	14.6	36.0	70
Manufacturing	9.5	25.2	125
Construction	4.8	16.9	100
Wholesale and Retail	9.9	31.9	107
Transport and Storage	7.4	19.8	53
Banking and Insurance	2.2	11.1	38
Public Administration	7.4	11.4	47
Services	6.9	21.7	90
Other Activities	24.7	34.7	52

Note: 1980 figures are rounded estimates

Source: Cyprus Popular Bank

TABLE 3.2

EMPLOYMENT BY SECTOR, AS A PERCENTAGE OF ECONOMICALLY ACTIVE
POPULATION

	1960	1970	1980
Agriculture	44.4	39.8	25.0
Manufacturing	14.4	14.6	21.9
Construction	9.6	10.5	10.3
Wholesale and Retail	7.6	8.8	10.9
Services	21.5	14.8	16.3
Unemployed	2.5	1.1	2.1

Source: Cyprus Popular Bank

TABLE 3,3DOMESTIC EXPORTS: PERCENTAGE DISTRIBUTION BY SECTOR

	1973	1978	1980
Food and Beverages	68.1	38.5	33.1
Industrial Supplies	24.9	24.2	24.0
Machinery and Allied Equipment	1.0	5.0	7.7
Consumer Goods	6.0	32.2	35.1

Source: Cyprus Popular Bank

Dryland agriculture predominates in terms of the area under cultivation (Table 3.4) and the labour employed. It is characterised by low land-labour productivity and low farm incomes. As Table 3.4 shows, cereals predominate and wheat and barley are grown extensively in the Mesaoria Plain. Cereals account for over half the area devoted to temporary crops. Vines are the next major dryland crop, covering 55% of the total area of permanent crops. Nearly a third of the farming population is engaged in some form of viticulture. Carobs, at one time the 'black gold' of Cyprus, have declined in importance due to high labour costs at harvesting. The same is true for olive and almond trees which can be seen scattered around the island, often intercropped with cereals and legumes. Many farmers rely on government subsidies for cereals and wine-grapes and a traditional cereal-fallow rotation, semi-subsistence in nature, is practised over wide areas. There are considerable problems of under-employment and part-time farming, although the introduction of an official programme of mixed farming in recent years has had some effect (Ashman, 1971, p. 25).

Irrigated land is more commercial and industrial in nature and mainly involves the production of citrus and vegetables. Only 14% of temporary cropped land is devoted to vegetable production, while citrus crops account for 8% of permanently cropped land. Since the irrigated area is only 12% of the total farm land, only a relatively small proportion of the farm population is engaged in this sector. Yet irrigated land is up to nine times more productive per unit area than its equivalent in dry areas, and irrigated crops make up the bulk of agricultural exports. Citrus occupies 37% of the total irrigated area and in 1980 its share of agricultural exports was 36%. Potatoes, occupying a slightly smaller area, are another major contributor, accounting for 27% of domestic agricultural exports in 1980. Farm incomes and 'status' in irrigated zones are higher than in dry land areas.

Animal husbandry is a dynamic sub-sector. Dairy cattle, pigs and

TABLE 3.4STRUCTURE OF AGRICULTURE, 1979 ('000 donums)

	Irrigated	Non-Irrigated	Total	%
TEMPORARY CROPS:				
Cereals	16	333	349	53.3
Legumes	10	16	26	4.0
Industrial Crops	2	3	5	0.8
Fodder Crops	10	172	182	27.8
Vegetables	93		93	14.2
Total	131	524	655	100.0
PERMANENT CROPS:				
Vines	20	236	256	55.4
Citrus	38		38	8.2
Fruit	28		28	6.1
Nuts	3	36	39	8.4
Olives and Carobs	5	96	101	21.9
Total	44	368	462	100.0

Note: 1 donum is equivalent to 0.133 hectares and 0.33 acres

Source: Agricultural Survey 1979

poultry are often reared on an intensive commercial basis in specialised livestock units. Production is mainly for home markets. Sheep and goats are often allowed to range freely and are reared on a semi-subsistence basis in family farming units.

Capital investment in agriculture is not high although there are considerable regional variations. In the highland areas there are low levels of mechanization and often animal traction is used. Irrigated and lowland dry-farming areas are generally more mechanised and sometimes the level of capital investment is high. Farmsteads are not a feature of the rural landscape although it is common to see small storage buildings for crops and tools scattered around some areas. Credit is provided through a Co-operative movement; private moneylenders, once a characteristic feature of Cyprus, no longer exist. Each village has its local branch of the Co-operative which often acts as a general store and post-office. The Co-operatives are also very important for agricultural marketing and supply inputs (Azinas, 1978, p. 40). Other marketing organizations include government agencies, official marketing boards and private groups of merchant dealers (Kanne, 1979, p. 43).

Despite its agricultural nature the island is not self-sufficient in food. Although food exports are higher in any one year than food imports the island still relies on imports for a number of its basic food requirements. Often these are products which cannot be cultivated for geographic or climatic reasons, but in some cases expansion of existing production would reduce imports.

In recent years the rural farming population of Cyprus has experienced a rapid decline. Rural-urban migration is an almost inevitable feature of an industrialising economy. In other countries such movement has its roots in the rationalization of methods of farm production, releasing labour for elsewhere. This has not been the case in Cyprus where migration has been the result of a number of factors, mainly related to the relative levels of

income in the agricultural and non-agricultural sectors and the distribution of incomes within these sectors (see Table 3.5). Movement out of rural areas has been particularly noticeable in highland zones such as Pitsilia (Peristiany, 1968). Outmigration 'push' factors include isolation, poor amenities, low standards of living, low incomes from agriculture due to poor agrarian structure and the determination of parents to educate their children so that more prosperous non-agricultural occupations can be followed. 'Pull' factors come from the urban centres with their modern life styles, amenities, services and employment opportunities. The remaining rural population is made up of those either too young or too old to leave. In such areas agriculture suffers from declining attention and consequent low yields. The result is a fall in incomes and a feedback effect to increased migration.

Partly as a result of low incomes, small holding sizes, rural-urban migration and agricultural decline, part-time farming has become widespread in Cyprus. According to the Agricultural Census of 1977 more than 54% of holders of agricultural land have off-farm occupations. The great majority of part-time farmers have been involved with outside occupations for some considerable time, although most still subjectively identify themselves with the farm sector and are concerned to expand this part of their activities (Pearce, 1981, p. 63). The most common source of off-farm income is the construction industry and either local or central government. A large majority of so-called 'farmers' are in fact engaged full-time in non-farming activities and the major family farm labour input comes from farmers' wives. In some areas farming is becoming an increasingly residual activity and the continuity of part-time farming becomes dependent on the willingness and ability of farmers' wives to bear this burden. Greater participation may be found by farmers in coastal areas, a reflection of the relative prosperity of these zones. The desire for greater income security as well as the provision of more adequate household income underlies the assumption of off-farm occupations.

TABLE 3.5AVERAGE REAL RATES OF PAY (1967 = 100)

	1970	1973	1978
All Activities	120	154	194
Agriculture	118	145	184
Manufacturing	112	144	195
Construction	133	179	214
Trade	106	141	174
Services	110	151	192

Source: Cyprus Popular Bank

The increase in part-time farmers poses problems for the future of agricultural development and improvement. This is particularly true in mountainous areas where the high proportion of migrating offspring reflects the questionable long-term viability of many part-time holdings. In other areas part-time farming may result in low levels of input and productivity and ultimately in land dereliction. Part-time farming tends to be rather rigid in its production structures, unable to adapt to changing market demands. 'Hobby farmers', a linked though separate phenomenon, have also shown a recent appearance. At the present time government agricultural development policy is not geared to the recognition and development of these various part-time interests.

3.3 THE LAND TENURE SYSTEM IN CYPRUS

The land tenure system in Cyprus defines the formal and customary arrangements which determine access to, and control over, resources and opportunities in rural areas. Land tenure has an important and multi-dimensional role within Cypriot society. The tenure system shapes the distribution of employment opportunities and incomes in the agricultural sector since the owner of a farm can choose to work his land with his family, with sharecroppers, wage-workers or machinery. It also carries with it political opportunities, including the right to tax and the right to judge. In addition, decisions on investment in social capital - education, transportation, hospitals - appear to be a prerogative of land ownership. The ownership of land in this small country has an ancient history and a long evolution and to all Cypriots is both the real and the symbolic source of a way of life.

3.3.1. Evolution

The emergence of the land tenure system in Cyprus is the end result of a long historical process of interaction among social, economic and political forces. Each of Cyprus's long list of colonisers has left his mark, some more clearly visible than others, on the contemporary landscape. Though the

origin of individual holdings can be traced to the Greek colonization, the system which gradually evolved up to the nineteenth century was a feudal one. Widespread peasant proprietorship is relatively recent, dating from the middle of the last century.

In pre-Christian times a form of communal ownership may have existed. Archaeological evidence has indicated that around the fifth century B.C. large estates were set apart from the priest-king and, although private ownership was known, it must have been rare (Milford, 1950, p. 65). All remaining lands were held in a rigid system against payment of tax.

The early Christian period was dominated by a few large landholders, the bulk of the rural population being divided into two groups - the 'coloni' or free farmers and the 'ascripti' or slave owners (Christodoulou, 1959). The former were tenants who belonged to a village society. Their land was probably state property or took the form of very large estates, usually owned by the Church. Since the community was taxed as a whole, each member was obliged to stay in the village to meet his share. Village lands were divided into lots and re-allocated to members of the community from time to time. In contrast the 'ascripti' lived in servile villages and surrendered the produce of their land to their masters who paid their taxes. It was this group that was truly 'bound' to the soil. Some private farms may also have existed, probably in the hands of soldiers or administrators. The former were given land and settled as free-holders on condition that they offered their military services when needed. These small holdings were inheritable but in times of peace the soldier farmers often reverted to the status of tenants and the big landowners re-appeared.

During the Middle Ages a more formal feudalism was introduced by the Lusignans. The largest landowners were the king, high officers of the state and the Latin Church. The large estates or 'fiefs' were inheritable. In Venetian times the division of land into fiefs was retained but many changed

from hereditary to life tenures. The rural population was made up of the 'parci' who owned the land that they cultivated but paid a percentage of their produce to the holder of the fief, and the 'lefteri' who were freemen. Feudalism was passed over to the Ottomans who occupied the island in 1571.

The Turkish period saw the reinforcement and maintenance of feudalism for administrative purposes. Conquered land became in theory state land and was given to peasants to cultivate in return for a proportion of their produce. Peasants were serfs to the state but the use of their land was inheritable. Thus tenancy was secure as long as the peasant cultivated his land and paid his dues and other burdens. During this period the Church amassed large amounts of property from donations. Most were from people who feared that their land would be forcibly taken from them; they knew that once it passed into the name of the Church it would be safe (Effendi, 1922, pp. 2 - 10).

In the middle of the nineteenth century the feudal system was abolished and a new land code instituted. Land became state property but with private rights of use widespread among the peasants. Peasants became possessors but not owners and were taxed in a form of rent, usually 10% of their produce.

The Land Code of 1857 was enacted with a view to increasing the amount of land under cultivation in order to raise tax receipts. Rights of use were registered, inheritable and transferable through sale, exchange or gift but were lost if land was left uncultivated for a specified period of time. In its essentials this Code remained in force until 1946.

Under the Land Code, Cypriot land was classified into five main categories:

- (i) Arazi Mirie (state owned lands) - this category covered all agricultural lands, forests and pastures whose ownership was with the state, but rights of use were issued to individual

peasants which were permanent, transferable and inheritable as long as their possessors kept the land under cultivation, paid their taxes and obeyed the laws. Fisher described this category as an 'inheritable leasehold' where the object of the lease is agricultural cultivation exclusively that the state may derive a tithe from the land (Fisher, 1919; Gerasimo, 1894).

- (ii) Arazi Memluke (privately owned lands) - this category included houses, sites for buildings, trees and vines planted or grafted by the peasants on land in category (i), water and small gardens near the village, all in absolute private ownership by individual peasants, such ownership extending "from the depths of the earth to the heights of the skies" (Camelaris, 1977).
- (iii) Arazi Metrouke (communally owned land) - this category included public squares, market places, pastures, woods for fuel etc., which were held in public or communal ownership by villages or towns.
- (iv) Arazi Mevcoufe (religious lands) - this category covered all lands, buildings, trees and water in the absolute ownership of Ottoman religious, cultural and charitable institutions. There were two kinds of mevcoufe: land dedicated in accordance with the formalities prescribed by the 'Sacred Law'; and land dedicated by Sultans or others with imperial sanction (Fisher, 1919).
- (v) Arazi Mevat (dead lands) - this category defined waste lands not claimed under any other category which lie "at such a distance from a village or town from which a loud human voice cannot make itself heard at the nearest point where there are inhabited places" (Fisher, 1919). Note that the above quotation demonstrates a primitive measure-

ment of distance. These lands were left over to state ownership and are also known as 'Hali Lands'.

In 1878 Britain occupied the island and inherited not only a Land Code but also a Land Registry full of corruption and inaccuracies. As Christodoulou (1959) noted, "The chaos and viciousness of land registration and tax assessment was to bedevil Cyprus and its government far into the twentieth century." While the British were careful to leave the Land Code as they found it and maintain the 10% tax on production (up to 1926), an attempt was made to reform the registration of rights and the tax assessment (since the efficient collection of taxes by the new rulers showed up the inequalities in a clearer light). They ordered a new registration and new title deeds were issued, but this only created more confusion with the clashing of old titles and the new. A new law of 1885 made the registration of land compulsory but this was largely ineffective.

It was not until the General Survey of 1909 - 29 that order was at last put into a state of affairs which had handicapped development and cost the peasant and state dearly in dispute and litigation. The new survey aimed to assess the value of the land and record the rights in the name of the possessor. The latter proved the more difficult and land registration proceeded at a very slow rate. In 1927 it covered only 36% of the total area and it is still continuing today on a sporadic basis (in 1977 25% of the island had still not been registered).

In 1945 the government viewed with some alarm the chaotic state of the land-use and tenure legislation and the trend towards smaller and more fragmented holdings. The various categories of land under the Ottoman Code and the separate provision for each, plus the divorce of ownership of land from that of buildings and trees, constituted an increasingly intolerable position. In 1939 legislation had been prepared to abolish the different categories of land but the war intervened before further progress could be made. In 1944 a Land Utilization Committee made recommendations to the government

on halting the increasing trend towards land fragmentation. Finally in 1946 a new law was passed.

This law, the Immovable Property (Tenure, Registration and Valuation) Law C.244, marked the final phase in the evolution of the present land tenure system. The new law abolished the various categories of land. Immovable property, known as 'mulk' and 'arazie mirie', became private property. Ownership rights of land replaced the rights of use as established in the middle of the last century and so "the fiction of State ownership and perpetual leasehold by the possessor came to an end ..." (Pavlidis, 1948). In fact, if the government had been more purposeful it could have used this 'fiction' to introduce compulsory principles of land-use. Instead, with one stroke the State relinquished all its claims to agricultural land.

The 1946 law did make an attempt to combat previous land tenure problems. In the use of separate ownerships of land and property it gave first priority to the landowner when property was on sale. Similarly, co-owners in undivided shares were given priority for the purchase of shares. Trees could no longer be allocated to more than one person nor could the land upon which they grew be separately allocated. In its attempts to limit fragmentation the law forbade the sale of an undivided share of less than £10 value to any but one or more of the co-owners and forbade the mortgage of such a share. Limits were also imposed on the minimum sizes for the division of a holding: in perennially irrigated land not less than one donum; in seasonally irrigated land not less than two donums, and in dryland not less than five donums. While the provisions of the new law were a desirable step forward, they were neither drastic nor very effective. The action of the law was both limited and slow and the existing land tenure system continued to hamper agricultural development.

With Cypriot independence in 1960 the situation formalised by the 1946 legislation passed over to the new State. In addition the new constitution safeguarded such legal ownership rights. Political changes in 1974, while

dramatically reducing the area under Greek Cypriot control, have not significantly changed the land tenure structure. In consequence the dominant land tenure feature today is that of private ownership with less than 1% of cultivated land remaining in State ownership.

3.3.2. Classification of the Present Land Tenure Structure

Various writers have attempted to classify the land tenure structure of Cyprus, often using as a basis the statistics contained in the 1946 and 1960 Agricultural Censuses. In 1971 Karouzis divided land tenure into six types: private land, church land, state land, communal land, co-operative farms and mixed tenures. This classification offers the clearest and most detailed insight into the existing land tenure structure. The tenure categories are quantified in Table 3.6 and can now be discussed in more detail.

The first class, private lands, is the largest category, accounting for 92.36% of the total agricultural land. Owners of holdings whose main occupations are agricultural constitute half of this group and comprise 38,486 holdings, most of which are family farms. Also numerous are the 30,883 holdings operated by owners whose main occupations are non-agricultural; these include both part-time farmers and speculative buyers. Considerable amounts of this land, particularly in irrigated areas, may be leased out. Private holdings that are tenanted, leased or share-cropped make up 7.75% of the agricultural area and may belong to absentee owners, non-farmers or owner-operators with too much land to farm themselves. Land belonging to companies, government farms and other institutions accounts for just 1.2% of agricultural land. Neglected private holdings make up the largest category of uncultivated land, 58.56%.

Church, monastery and Moslem religious properties form the second tenure group, occupying 6.48% of the total agricultural land. Such properties originated from royal donations during the Byzantine period and from private donations during the Turkish period. Today donations are few and, in recent decades, the Church has sold much of its land in agricultural areas

TABLE 3.6A CLASSIFICATION OF LAND TENURE IN CYPRUS

Land Tenure Categories	Agricultural Land		Uncultivated Land	
	Area (donums)	%	Area (donums)	%
PRIVATE LAND	2,986,062	92.36		
Owner-operated	1,496,089	46.28		
Holdings of non-farmers	1,200,522	37.13		
Tenanted, leased, sharecropped	250,508	7.75		
Neglected holdings			1,141,651	58.56
Companies, Govt. farms etc.	38,943	1.20		
CHURCH, MONASTERY, RELIGIOUS	209,612	6.48		
STATE LAND	35,502	1.13	764,000	39.19
COMMUNAL LAND			44,000	2.25
CO-OPERATIVE FARMS	820	0.03		
MIXED TENURES				
Total	3,232,966	100.00	1,949,651	100.00

Source: Karouzis (1971b)

Note: A discrepancy in Karouzis's original table is evident; column 2 should add up to 3,231,996 and the percentage values for state land should be 1.10% and for co-operative farms 0.02%.

to individuals, in favour of more profitable investment in towns.

State land, the third grouping, contains 1.13% of agricultural land and 39.14% of uncultivated land. The latter includes 'Hali land', or waste lands left over from the General Survey of 1909 - 1927 when they remained unclaimed. Such lands are of poor quality and are scattered in parcels of varying size among privately owned plots, often being used for the free-grazing of livestock. Agricultural lands in this category are usually nurseries or demonstration farms or may be rented to individuals.

Communal lands, the fourth group, are not an important category as far as area or quality are concerned. Known locally as 'merras', they are a relic from the Turkish period and consist of small compact grazing lands and forests usually at short distances from the village settlement. With the increasing use of gas and electricity and the decline of rural crafts, communal forests have lost importance although recently they have acquired a new recreational value.

Co-operative farms, the fifth land tenure group, occupy only 0.03% of the total agricultural land and have little significance within Cypriot land ownership.

Mixed tenures, the sixth and final land tenure category, include both undivided shares and multiple ownerships. They are not quantified in Table 3.6. Such tenures are, however, an important characteristic of Cypriot land ownership and will be discussed in greater detail in the next section of this chapter.

The Agricultural Census of 1977 provides a more recent picture of the existing land tenure but is based on a cruder, four-fold classification. As Table 3.7 shows, the great majority of land is still in private hands and a very much smaller amount is owned by the Church, while the remainder is the property of the government or is communal land. The peculiarities and problems of the private individual agricultural holding are also discussed

TABLE 3.7MAIN LAND TENURE GROUPS, 1977

Tenure Groups	Owned	Rented	Total	%
Private	1,090,164	309,774	1,399,938	93.28
Government	5,895	14,990	20,885	1.39
Church	48,182	27,034	75,216	5.01
Communal	588	4,073	4,661	0.31

Note: All figures are in donums

Source: Republic of Cyprus: Census of Agriculture 1977, Vol. 1

in more detail in the next section.

3.4. THE STRUCTURE OF THE AGRICULTURAL HOLDING AND THE PROBLEM OF FRAGMENTATION

Agricultural holdings in Cyprus are characterized by three factors - their small size, their high level of fragmentation and their mixed tenures. Each of these will be considered in turn.

The data presented in Table 3.8 clearly demonstrate that, in 1977, an unequal distribution of holders and land existed. For example, 58.3% of all owners have holdings below 20 donums and, of these, 60% are below 10 donums. The total area owned by the latter group of holders is only 193,793 donums, or 12.9% of the total agricultural area. In contrast the remaining 46.2% of owners hold 1,306,907 donums, or 87.1% of the total agricultural area. However, strong polarization of land ownership is not unusual in countries with a free land market. The dominant characteristic in Cyprus is that the small holding predominates in the size pattern of Table 3.8.

Not only are holdings small, they are also fragmented (Table 3.9). In 1977 24,710 holdings, 56.4% of the total, contained more than four plots and - of this group - 37.8% were highly fragmented with 10 or more plots. Small holding size and high fragmentation naturally lead to small plot size. The average number of plots per holding is 6.3 with an average plot size of 5.3 donums. Table 3.9 also shows that the level of fragmentation increases with holding size.

Data on forms of multiple tenure in Cyprus are not available from the Census. However, information collected by Karouzis during a field survey in Paphos district from 1968 to 1970 and by Christodoulou during an earlier field investigation in 1957 clearly highlights the role of mixed tenures in the Cypriot holding (Christodoulou, 1974; Karouzis, 1980). Two types of mixed tenures have been described - 'undivided shares' and 'dual ownership'.

TABLE 3.8DISTRIBUTION OF HOLDING SIZES, 1977

Size Class (donums)	Number of Holdings	%	Area of Holdings	%
Landless	715			
Less than 1	896	2.1	442	0.1
1 - 2	1,771	4.1	2,186	0.2
2 - 5	5,167	11.8	16,214	1.1
5 - 10	6,452	14.7	45,006	3.0
10 - 15	5,228	11.9	61,912	4.1
15 - 20	4,042	9.2	68,033	4.5
20 - 40	9,740	22.2	272,219	18.1
40 - 60	4,628	10.6	222,341	14.8
60 - 80	2,370	5.4	161,084	10.8
80 - 100	1,308	3.0	114,654	7.6
100 - 150	1,365	3.1	160,990	10.7
150 - 200	406	0.9	67,898	4.5
200 - 1000	43	0.1	28,215	1.9
Over 1000	51	0.1	186,579	12.4
Total	44,522	100.0	1,500,700	100.0

Note: 'Landless' holdings consist mainly of livestock enterprises (piggeries etc.) which involve little or no surface area.

Source: Republic of Cyprus: Census of Agriculture 1977

Additional note: A discrepancy occurs in the original table in the Census. The totals in columns 2 and 4 do not agree with the addition: 44,522 should be 44,182 and 1,500,700 should be 1,407,773. Nor do the percentage figures in columns 3 and 5 agree with either the stated or the amended totals.

TABLE 3.9

FRAGMENTATION OF HOLDINGS, 1977

Holdings With:	Number of Holdings	Number of Plots	Total Area (donums)	Average Area of Plot	Average Area of Holding
1 plot	8,737	8,737	81,604	9.3	9.3
2 - 3 plots	10,360	25,304	183,822	7.3	17.7
4 - 5 plots	7,113	31,689	176,196	5.6	24.8
6 - 9 plots	8,250	59,926	298,224	5.0	36.1
Over 10 plots	9,347	156,034	760,854	4.9	81.4
Total	43,807	281,690	1,500,700	5.3	34.3

Source: Republic of Cyprus: Census of Agriculture 1977

Land in undivided shares has its origin in the pattern of inheritance which, from the Ottoman period to the present day, entitles each heir to a legal share in each and every part of the property of the deceased. Denominators of shares may run into tenths, hundredths, thousandths or even millionths. Karouzis' study of four villages in the Paphos coastal plain revealed that 48.9% of all ownerships included land held in undivided shares which amounted to 13.3% of total land (Table 3.10). In the same district other data prepared before the implementation of land consolidation schemes revealed that the area held in undivided shares, calculated by village, ranged from 10.3% to 28.9% (Land Consolidation Authority, 1976). Christodoulou's work in Dhali village (between Larnaca and Nicosia) again demonstrates the important role of undivided shares in the land tenure structure (see Table 3.11). He showed that share fractions can be extremely small, but the majority of holders (71.6%) fall within the group between one half to one eighth.

Dual ownership is the situation where land is owned by one person (or, if under undivided shares, by more than one) and trees on this land may be owned by another person. Dual ownership dates back to the Ottoman Land Code when land and trees were classified into two different categories with different ownership rights - land as Arazi Mirie and trees as Arazi Memluke. Consequently land and trees had to be registered separately, even if they belonged to the same person, and the legislation (until 1946) allowed the transfer of land and tree rights separately. Today dual ownership has reached extensive proportions and hundreds of thousands of trees, mostly olive and carob, are owned in this form. Many 'properties' in fact contain trees but no land.

3.4.1. National Land Tenure Trends, 1946 - 77

The three censuses of 1946, 1960 and 1977 provide a statistical record of land tenure changes enabling us to describe recent trends within the agricultural holding pattern, first for size and then for fragmentation.

TABLE 3.10

UNDIVIDED SHARES IN FOUR PAPHOS DISTRICT VILLAGES

Village	Total No. of Ownerships	Ownerships in Undivided Shares No.	Ownerships in Undivided Shares %	Total Area (donums)	Area in Undivided Shares Area	Shares %
Kissonerga	419	232	55.4	6,365	814	12.8
Kouklia	257	124	48.3	13,852	1,220	8.8
Nikoklia	87	41	47.1	1,962	342	17.4
Timi	329	137	41.6	8,137	1,649	20.3
Total	1,092	534	48.9	30,316	4,025	13.3

Source: Karouzis (1980, p. 22)

TABLE 3.11SHARE FRACTIONS IN DHALI VILLAGE

Share Fraction	Plots Owned in Undivided Shares	
	No.	%
$\frac{1}{2}$	155	6.5
$\frac{1}{2} - \frac{1}{4}$	780	32.8
$\frac{1}{4} - \frac{1}{8}$	923	38.8
$\frac{1}{8} - \frac{1}{16}$	285	12.1
Smaller than $\frac{1}{16}$	230	9.7

Source: Christodoulou (1974, p. 4)

The average agricultural holding has shown a 20% reduction in size from 1946 to 1977. The mean size for the whole country in 1946 was 53.9 donums, in 1960 it was 46.5 donums and in 1977 33.7 donums. The mean Cypriot holding size is shrinking dramatically!

This trend is not evenly distributed through the various land-holding groups, however. As Table 3.12 shows, the largest increases in holdings occurred in the below 5 donum group. Here an increase of more than 12 percentage points is recorded, while changes in the area occupied are negligible. Increases in the proportion of owners in the 5 - 10 donum group are around 5 percentage points. In the 10 - 20 donum class owners have increased by 2.8 percentage points while the total area in this group has grown by 4 percentage points. In the next four groups, ranging from 20 - 100 donums, there have been small reductions in percentage points in the numbers of owners, although in the 20 - 40 donum and 40 - 60 donum groups this has been accompanied by an increase in percentage points in the area owned. The 100 - 200 donum class shows the largest reduction in percentage points of both owners and area owned.

The trend towards smaller holdings can be further quantified by the index of concentration (β). This is given by the formula:

$$\beta = \frac{\sum x^2}{(\sum x)^2} \times 100$$

where x is the number of holdings in each class expressed as a percentage of the total number of holdings. The index has a maximum value of 100, indicating complete concentration in one holding class, and a minimum value of 0, indicating uniform dispersion amongst all the holding classes. Using the percentage area and percentage number of holdings data in Table 3.12, the index was calculated. In 1946 the β value for the number of holdings per class was 14.18, in 1960 it was 13.12 and in 1977 it was 30.16. The β index for the area of holdings shows a similar trend: in 1946 15.34, in 1960 13.4 and in 1977 26.12.

TABLE 3.12LAND TENURE TRENDS, 1946-77

Size Classes (donums)	1946		1960		1977	
	No. of Hold- ings %	Area %	No. of Hold- ings %	Area %	No. of Hold- ings %	Area %
0 - 5	5.3	0.3	11.7	0.6	18.0	1.4
5 - 10	9.8	1.3	11.5	1.7	14.7	3.0
10 - 20	17.3	4.6	17.8	5.5	20.1	8.6
20 - 40	23.2	12.3	22.2	13.6	24.2	18.1
40 - 60	14.3	12.9	13.1	13.7	10.6	14.8
60 - 80	9.2	11.8	8.0	11.8	5.4	10.8
80 - 100	6.0	10.0	5.1	9.7	3.0	7.6
100 - 200	11.2	27.8	8.2	23.6	4.0	15.2
200 - 500	2.5	12.7	2.1	12.5	0.8	6.2
500 - 1000	0.2	2.2	0.2	2.8	0.1	1.9
Over 1000	0.1	3.9	0.1	4.3	0.1	12.4
	1946		1960		1977	
Total No. Holdings	60,179		69,445		44,522	
Total Area (donums000)	3,246		3,233		1,501	
Mean Holding Size	53.9		46.5		33.7	
Mean Plots per Holding	12.6		9.5		6.4	
Mean Plot Size	4.24		4.89		5.43	

Note: The 1977 data refer to the 60% of Cyprus remaining under Greek Cypriot control.

Sources: Republic of Cyprus: Census of Population and Agriculture 1946, Report;
Census of Population and Agriculture 1960, Vol. 4;
Census of Agriculture 1977, Vol. 1

Additional note: Discrepancies in the original Censuses mean that the % holding figures in columns 2 and 6 do not add up exactly to 100%.

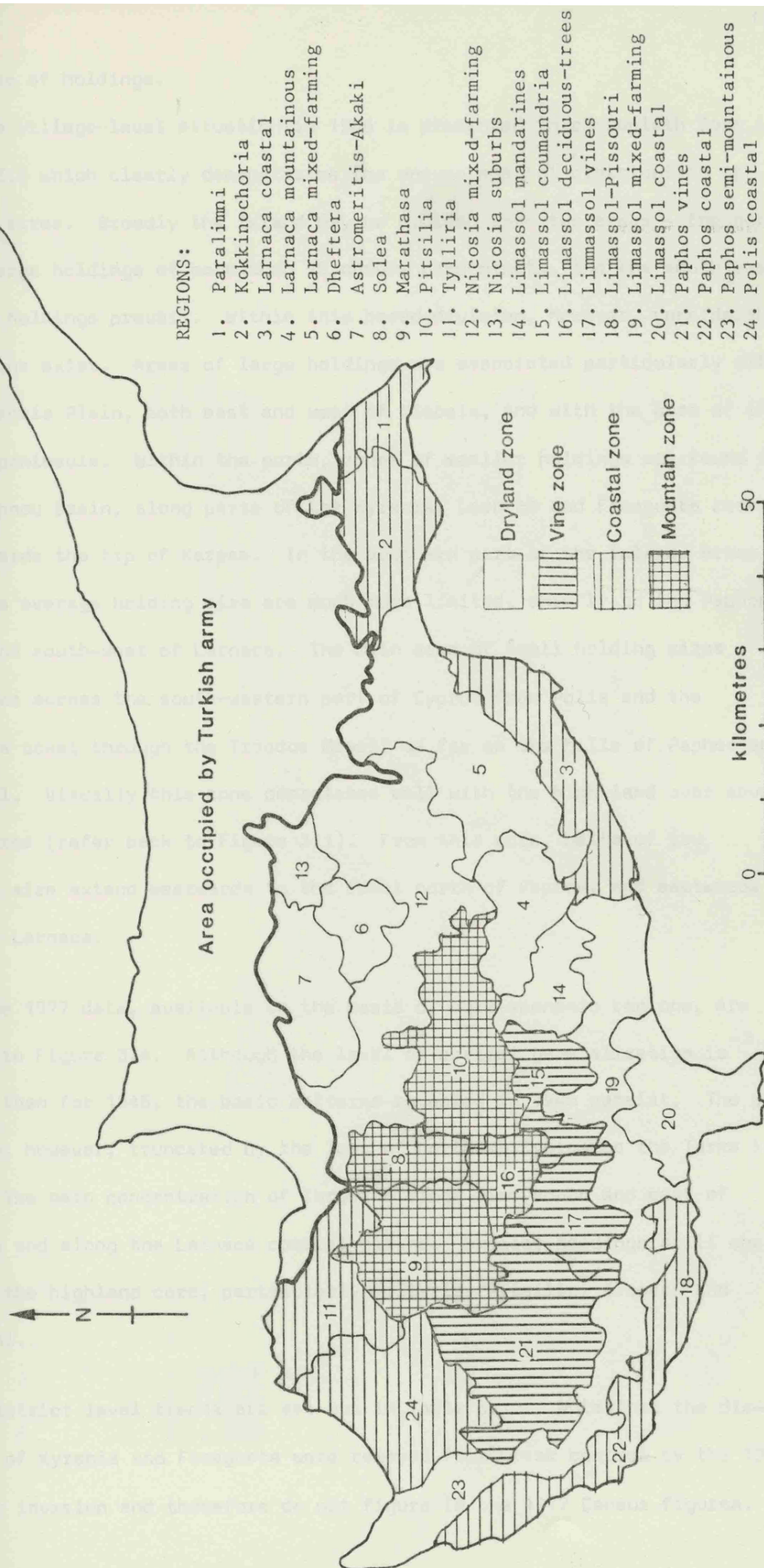
While the average holding size has shown a decrease so has the average size of the operated unit. In 1946 this was 46.6 donums and, in 1977, it had fallen by almost a half to 25 donums. The operational unit is thus decreasing at a faster rate than the ownership unit.

Regarding fragmentation, the average figures for the three censuses show that while holdings in Cyprus remain highly dispersed into scattered plots, the 'level' of fragmentation is falling. In 1946 the average number of plots per holding was 12.6, in 1960 it was 9.5 and, in 1977, it had fallen to 6.4 - reduction of nearly 50% in 31 years. Meanwhile, average plot sizes have shown a 10% increase from 4.24 donums in 1946 to 5.43 donums in 1977. The national trend thus appears to be towards holdings that are both less fragmented and have larger plots, but which are smaller in terms of holding size. However, this trend may not reflect any 'real' movement away from the fragmentation of holdings, but may rather be the result of the growth of the small holding class which has a lower average level of fragmentation. It is also possible that changes in holding size and fragmentation recorded in 1977 are partly due to the loss of nearly 40% of the island to Turkish control in 1974. But as tenure characteristics in the north, as recorded in the 1946 and 1960 censuses, were not markedly different from those in the rest of the island, this hypothesis is unlikely to be true.

3.4.2. Regional Variations in Land Tenure Trends, 1946 - 77

Considerable spatial variations in holding size, fragmentation and plot size exist in Cyprus. Each of these can be demonstrated at three levels, representing various stages of generalization: the village level in 1946; the agro-economic region in 1977 and the administrative district in 1946, 1960 and 1977. Unfortunately, the most detailed data are the most dated. Figure 3.2 shows the boundaries and names of Cyprus's agro-economic regions; district boundaries can be seen by referring back to Figure 3.1.

FIGURE 3.2 AGRO-ECONOMIC REGIONS OF CYPRUS



(i) Size of holdings.

The village-level situation in 1946 is presented in choropleth form in Figure 3.3 which clearly demonstrates the uneven spatial distribution of holding sizes. Broadly the island may be divided into two areas - the north where large holdings of more than 70 donums predominate, and the south where smaller holdings prevail. Within this broad division, however, considerable variations exist. Areas of large holdings are associated particularly with the Mesaoria Plain, both east and west of Nicosia, and with the base of the Karpas peninsula. Within the north, zones of smaller holdings are found in the Morphou Basin, along parts of the Kyrenia, Larnaca and Famagusta coasts and towards the tip of Karpas. In the southern part of the island, areas of large average holding size are much more limited, chiefly to the Paphos coast and south-west of Larnaca. The main area of small holding sizes stretches across the south-western part of Cyprus from Polis and the Tillyria coast through the Troodos Massif as far as the hills of Paphos and Limassol. Visually this zone correlates well with the high land over about 600 metres (refer back to Figure 3.1). From this core, belts of low holding size extend westwards to the coast north of Paphos, and eastwards towards Larnaca.

The 1977 data, available on the basis of agro-economic regions, are mapped in Figure 3.4. Although the level of spatial generalization is higher than for 1946, the basic patterns revealed in 1946 persist. The pattern is, however, truncated by the loss of northern Cyprus to the Turks in 1974. The main concentration of large holdings lies south and east of Nicosia and along the Larnaca coastal plains. Smaller holdings still characterise the highland core, particularly Tillyria, Pitsilia, Troodos and Limassol.

District level trends are set out in Table 3.13. Note that the districts of Kyrenia and Famagusta were removed from Greek control by the 1974 Turkish invasion and therefore do not figure in the 1977 Census figures.

FIGURE 3.3 AVERAGE SIZE OF HOLDING BY VILLAGE, 1946

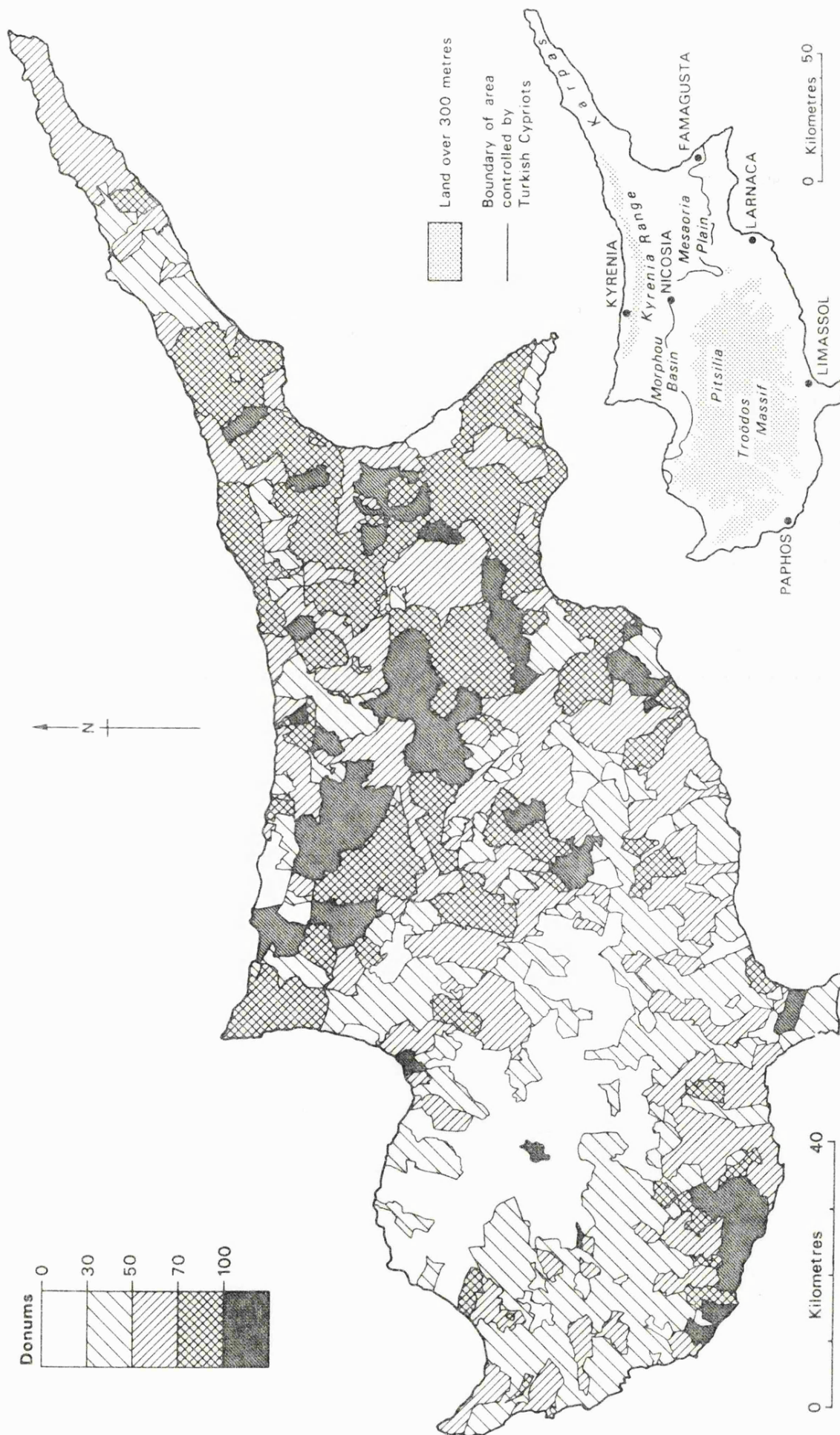
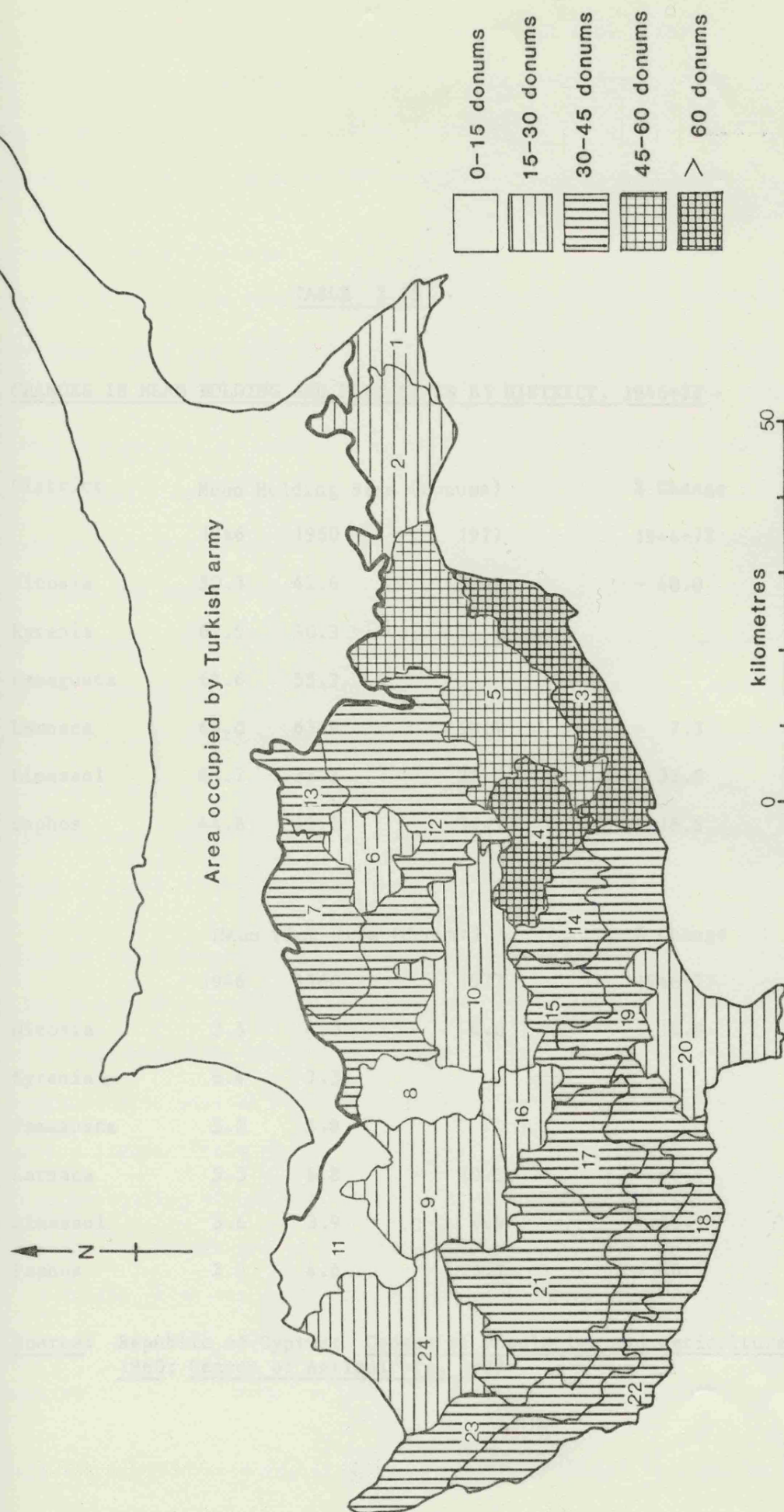


FIGURE 3.4 AVERAGE SIZE OF HOLDING BY AGRO-ECONOMIC REGION, 1977



SOURCE: Republic of Cyprus 1977, Census of Agriculture

TABLE 3.13CHANGES IN MEAN HOLDING AND PLOT SIZES BY DISTRICT, 1946-77

District	Mean Holding Size (donums)			% Change 1946-77
	1946	1960	1977	
Nicosia	50.3	42.6	30.2	- 40.0
Kyrenia	62.9	50.3		
Famagusta	68.6	55.7		
Larnaca	63.0	63.9	58.4	- 7.3
Limassol	41.7	35.2	28.1	- 32.6
Paphos	44.6	43.2	36.3	- 18.6

	Mean Plot Size (donums)			% Change 1946-77
	1946	1960	1977	
Nicosia	3.5	4.0	4.0	+ 14.3
Kyrenia	6.4	7.3		
Famagusta	5.2	5.8		
Larnaca	5.5	6.8	10.8	+ 96.4
Limassol	3.6	3.9	4.9	+ 36.1
Paphos	3.9	4.6	5.7	+ 46.2

Source: Republic of Cyprus: Census of Population and Agriculture
1960; Census of Agriculture, 1977

Also lost was a substantial portion of Nicosia district and a tiny area of Larnaca district; the 1977 figures for these districts are, therefore, based on reduced areas. Mean holding size declined most dramatically in Nicosia and Limassol districts, the decline generally being more rapid between 1960 and 1977 than between 1946 and 1960.

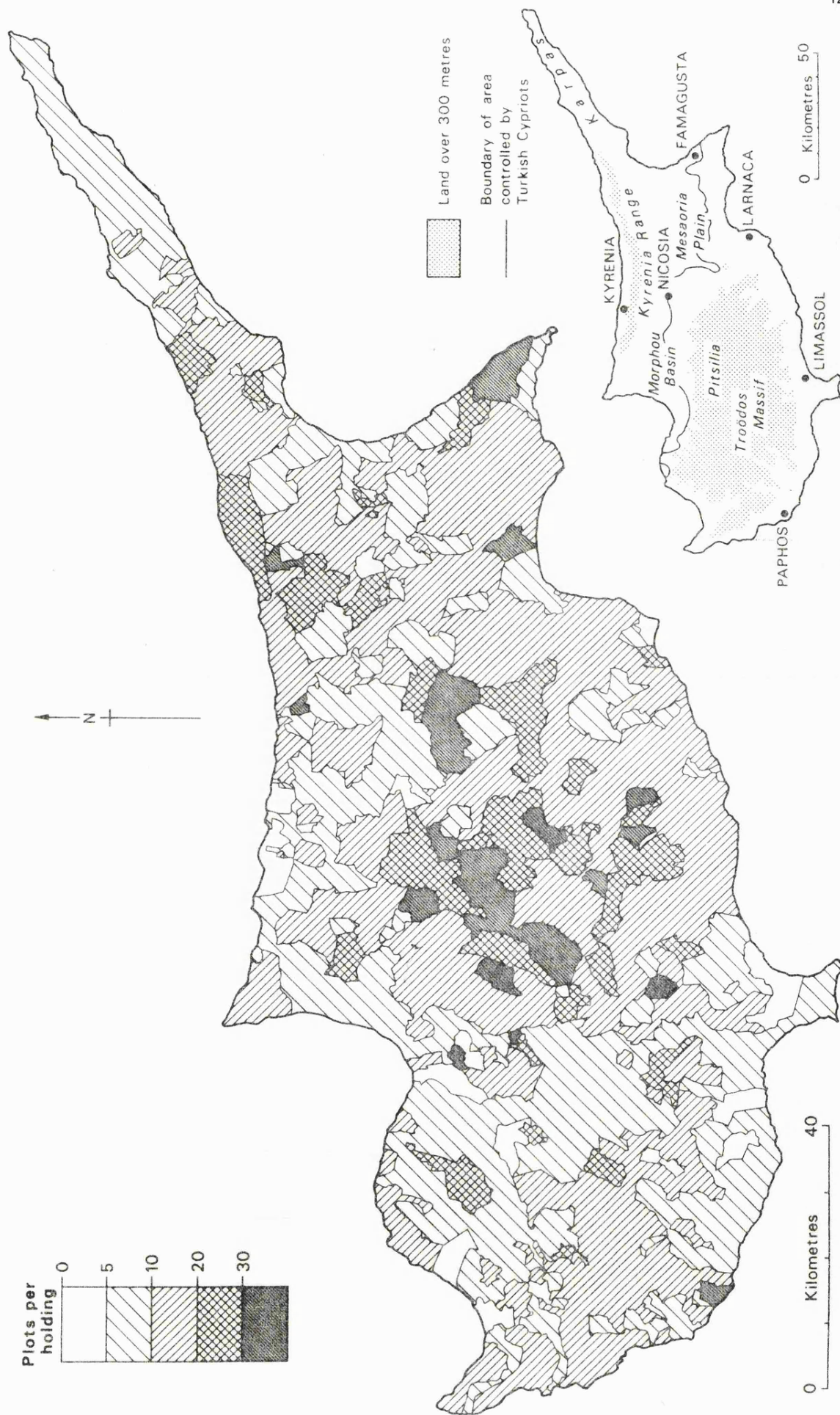
(ii) Fragmentation of holdings.

Figure 3.5 shows the 1946 village-level pattern of fragmentation, expressed as mean plots per holding for each village territory. The central area of high fragmentation is clearly evident. Comprising about one third of the area of Cyprus it is centred east of the main Troodos Massif and coincides especially with the Pitsilia region and the lower hill country of Limassol and Larnaca districts. Smaller 'islands' of high fragmentation are found along the north coast at the base of the Karpas and at Paralimni, south of Famagusta. Fragmentation also attains moderately high levels on the western flanks of Troodos. While the central zone exhibits a certain sense of cartographic cohesiveness there are peaks of very high fragmentation within this dome. The dominant peak extends eastwards from Pitsilia towards the lowland west of Nicosia. Subsidiary peaks lie to the south. At Alithenou village the average reaches a staggering 86 plots per holding!

Areas of low fragmentation are mostly coastal, with extensions into Troodos and the southern Mesaoria. Even in these districts holding averages of less than five plots form only small hollows in the fragmentation surface, e.g. west of Kyrenia, around Limassol and around Polis. A trough of low fragmentation (mostly 5 - 10 plots per holding) lies from north to south cutting across the highland Marathasa area. A further trough follows the boundaries of the Mesaoria Plain. The north-eastern tip of the island joins the sweep around Famagusta Bay to form the final main region of relatively low fragmentation. Overall it would appear that fragmentation of land holdings is linked to fragmentation of relief.

This association becomes, if anything, clearer in the 1977 map of agro-

FIGURE 3.5 FRAGMENTATION BY VILLAGE, 1946



economic regions (Figure 3.6). Pitsilia and the hillier zones of Limassol and Larnaca districts are still dominant and there is a further region of high fragmentation west of Nicosia. Moderate fragmentation extends over Troodos and the Paphos hills. Low fragmentation is clearly coastal, extending in a continuous belt from Paphos in the south-west to Paralimni just to the south of Famagusta.

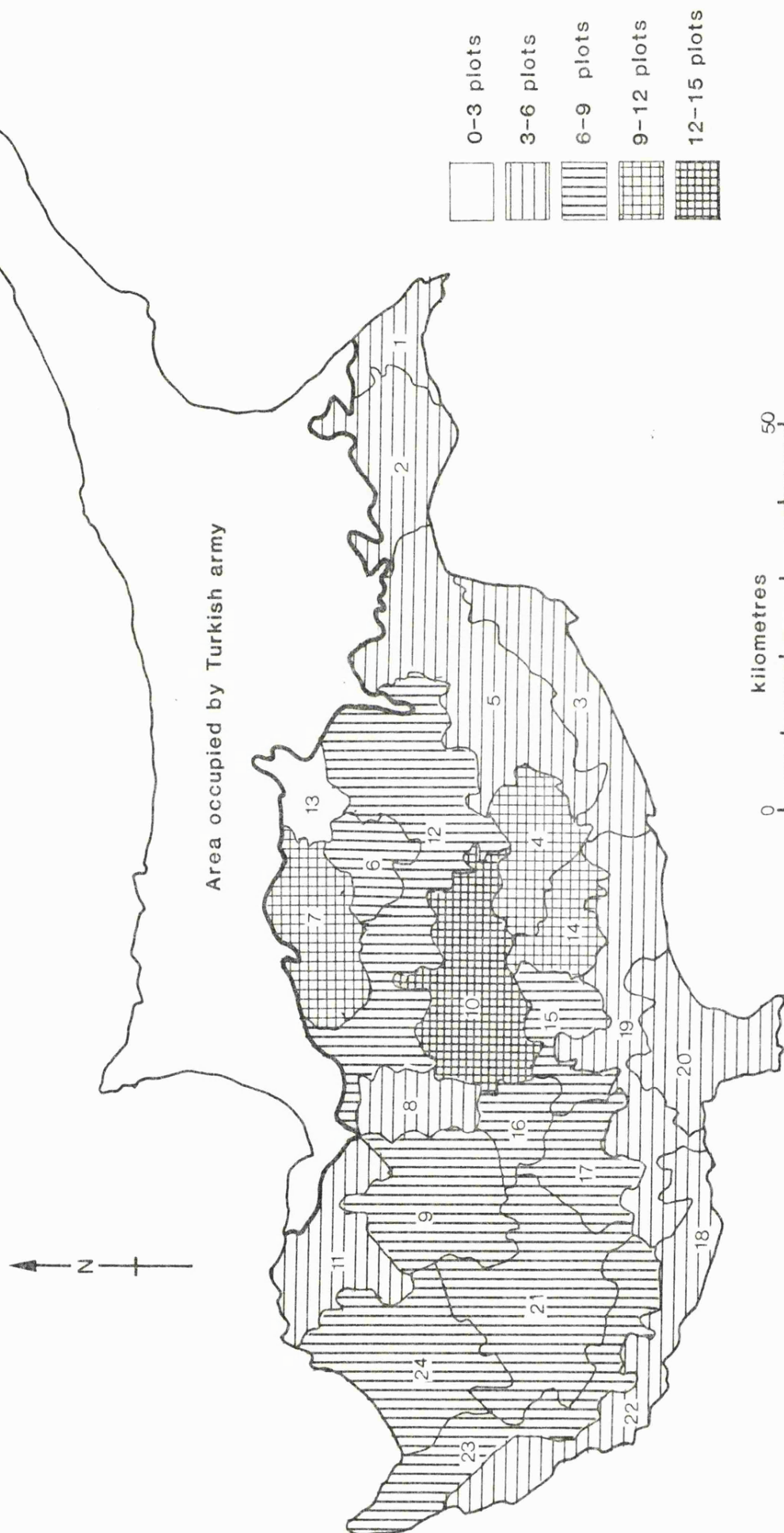
(iii) Plot sizes

These are obviously a function of level of fragmentation and size of holding. Average plot size is a valuable parameter since in a sense it defines the areal extent of the effective operational unit. Plot sizes are largest where fragmentation is low and holdings are large. Large plot sizes are a feature of coastal Cyprus, while small plot sizes dominate the inland area (see Figure 3.7 based on the 1977 agro-economic region data). Table 3.13 shows a strong increase of mean plot size for all districts 1946 - 77, the increase being nearly 100% for Larnaca district.

3.4.3. Towards Natural Structural Change?

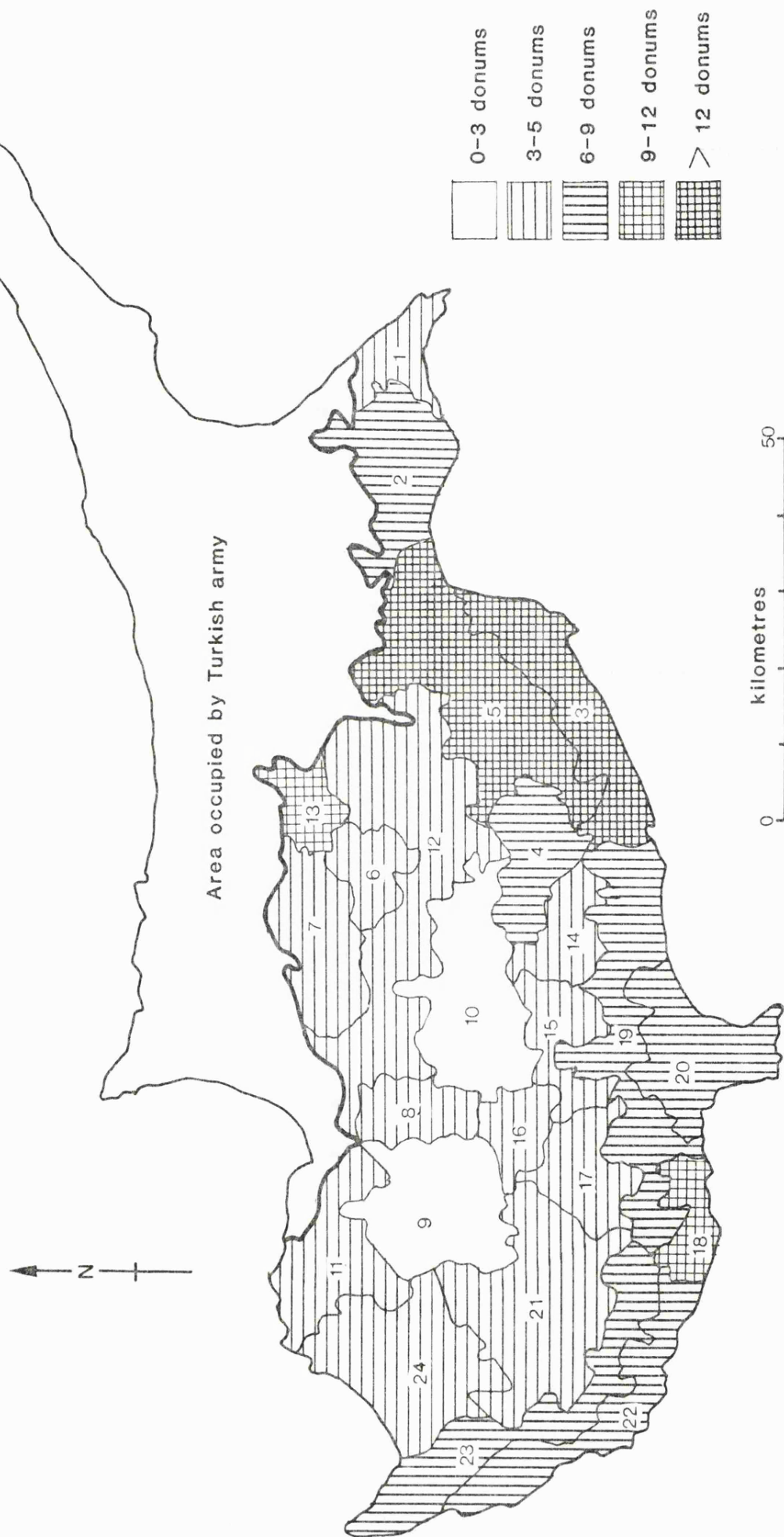
The data presented above demonstrate that the continuous evolution of the land tenure system in Cyprus is creating a 'natural' structural change that varies over both time and space. For example, analysis at the district level has shown that Larnaca district, during 1946 - 77, exhibited the lowest decline in average holding size, the fastest decline in average fragmentation levels and the largest growth in average plot size. During the same period, Nicosia district had the fastest decline in average holding size, the lowest decline in average fragmentation levels and the smallest growth in average plot sizes. It would thus appear from these data that natural positive structural change (i.e. in favour of larger holdings and plots) tends to favour areas that contain low levels of structural problems, while those areas exhibiting a high degree of structural difficulty lag behind.

FIGURE 3.6 FRAGMENTATION BY AGRO-ECONOMIC REGION, 1977



SOURCE: Republic of Cyprus, 1977, Census of Agriculture

FIGURE 3.7 AVERAGE PLOT SIZE BY AGRO-ECONOMIC REGION, 1977



SOURCE: Republic of Cyprus 1977, Census of Agriculture

3.5 WATER - AN ADDED DIMENSION

In many areas of the world water is the key natural resource. The productivity of land, labour and capital depend upon the adequacy of the available water supply. In Cyprus one is constantly reminded of the need for water and can see the remnants of Roman aqueducts and rain collecting systems, Turkish chains-of-wells, massive concrete dams, open irrigation ditches, miles of iron pipes of various ages and modern wells (Thorp, 1961). Cyprus has no perennial rivers and few underground sources. All water supplies have their origin in the rain that falls upon the island in a single short season each year. Every Cypriot is well aware of the value of water and to him it may mean the difference between poverty and prosperity (Ward, 1954).

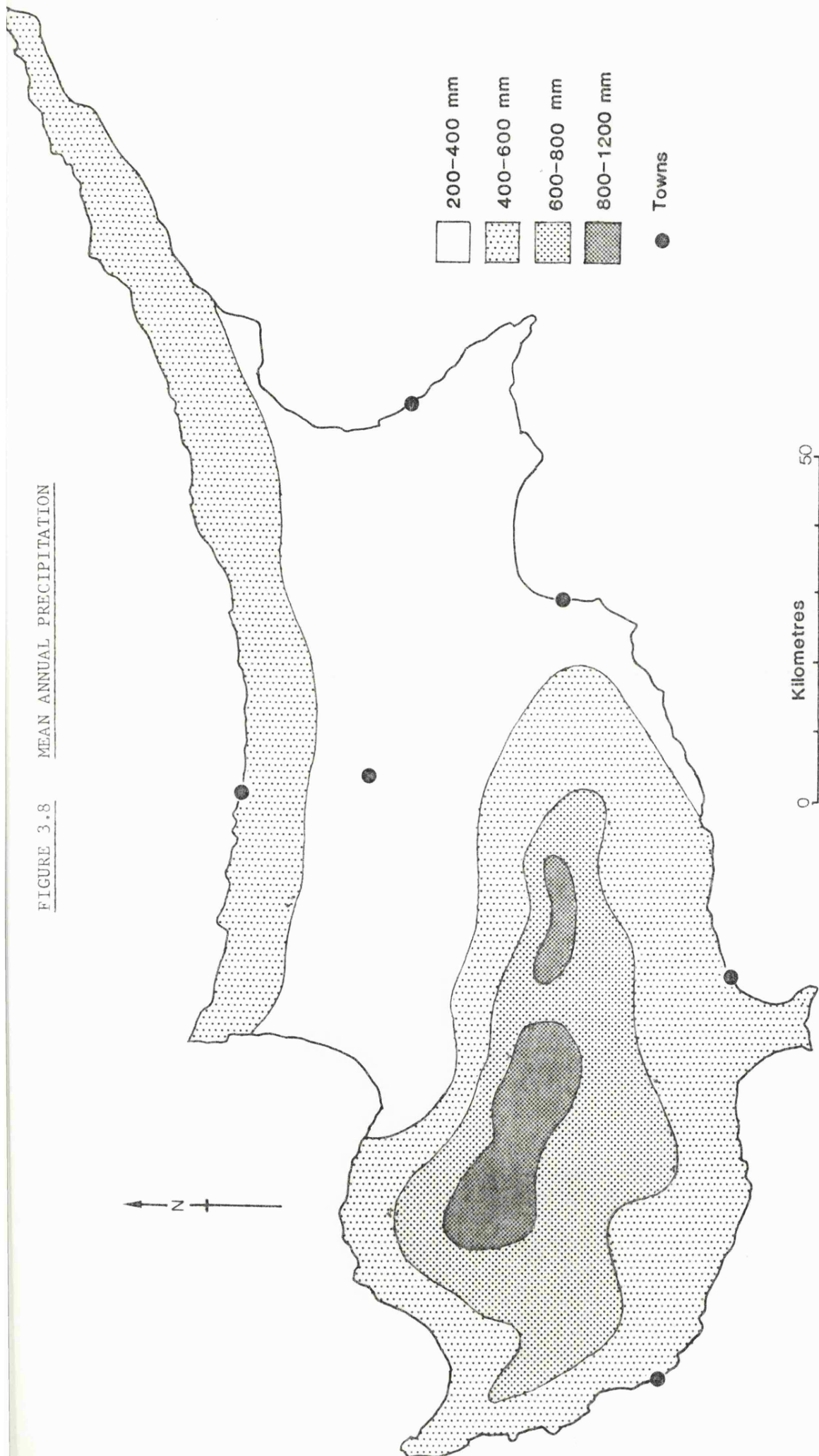
Due to its geographical position and the prevailing climatic conditions, Cyprus may be classified as a semi-arid country, exposed to the whims of a low, unevenly distributed and unreliable rainfall pattern. There are wide fluctuations from the island-wide annual mean of 500 mm. May to October are the dry months. The wettest months are November to February when 80% of the total rain falls. Rainfall is often unreliable in March and April, the critical months for wheat, barley and legumes which make up the bulk of the rain-fed crops.

Superimposed upon this picture are considerable regional variations. Annual rainfall is greater on the hills than on the plains and the variation for practical purposes is proportional to altitude though there are some rain-shadow effects, for example in the Morphou Basin. On the plains average annual rainfall is around 350 mm while above 1400 m it is 890 mm (Figure 3.8).

3.5.1. The Water Resources

The total average annual volume of rainfall is $4.6 \times 10^9 \text{ m}^3$ of water. Some 64% of this is lost by direct evaporation and evapotranspiration from

FIGURE 3.8 MEAN ANNUAL PRECIPITATION



non-agricultural areas and 20% is utilised by cropped land. Water from boreholes, dams and springs accounts for 9% of the total rainfall while surface losses to the sea account for 7% (Republic of Cyprus, 1973).

Recent studies by the Cyprus Water Planning Project (supported by UNDPP and FAO) reached the provisional conclusion that current utilization of ground water resources stood at $40 \times 10^8 \text{ m}^3$ per annum. This amount could be increased by 30 - 50% by the end of the century. This implies that unless measures for the proper conservation, development and utilization of water resources continue in an effective manner, a situation will soon be reached in which the water problem will become so acute that the further development of all sectors of the economy and particularly agriculture will be severely curtailed.

The basic problem is one of a regional imbalance in the potential supply and demand for water. The relief, prevailing climate and drainage of the main rivers favour the south-west of the island, while the greatest demand and water shortages occur in the major urban and touristic centres (Limassol and Nicosia) and in the rich agricultural area of Kokkinochoria in the south-east. In the central highland areas of Troodos and Pitsilia water resources are greater but here demands are much less.

The geological structure of the island has a considerable influence on the occurrence of both underground and surface water (see Figure 3.9). In the central Troodos Massif the impervious igneous and volcanic rocks cannot absorb the relatively high rainfall and so water flows down the hill valleys to lower land, or is lost through evaporation. A small part finds its way into cracks and fissures and emerges as springs. Generally these rocks yield practically no water from boreholes. South and east of the Troodos range lie the chalky white limestones and marls of the Pakhna and Lapithos beds which are Miocene and Eocene in age. These are not capable of absorbing much water, although there are a few places where such rocks have been found to yield underground water from boreholes. In Mesaoria,

FIGURE 3.9 WATER RESOURCES OF CYPRUS

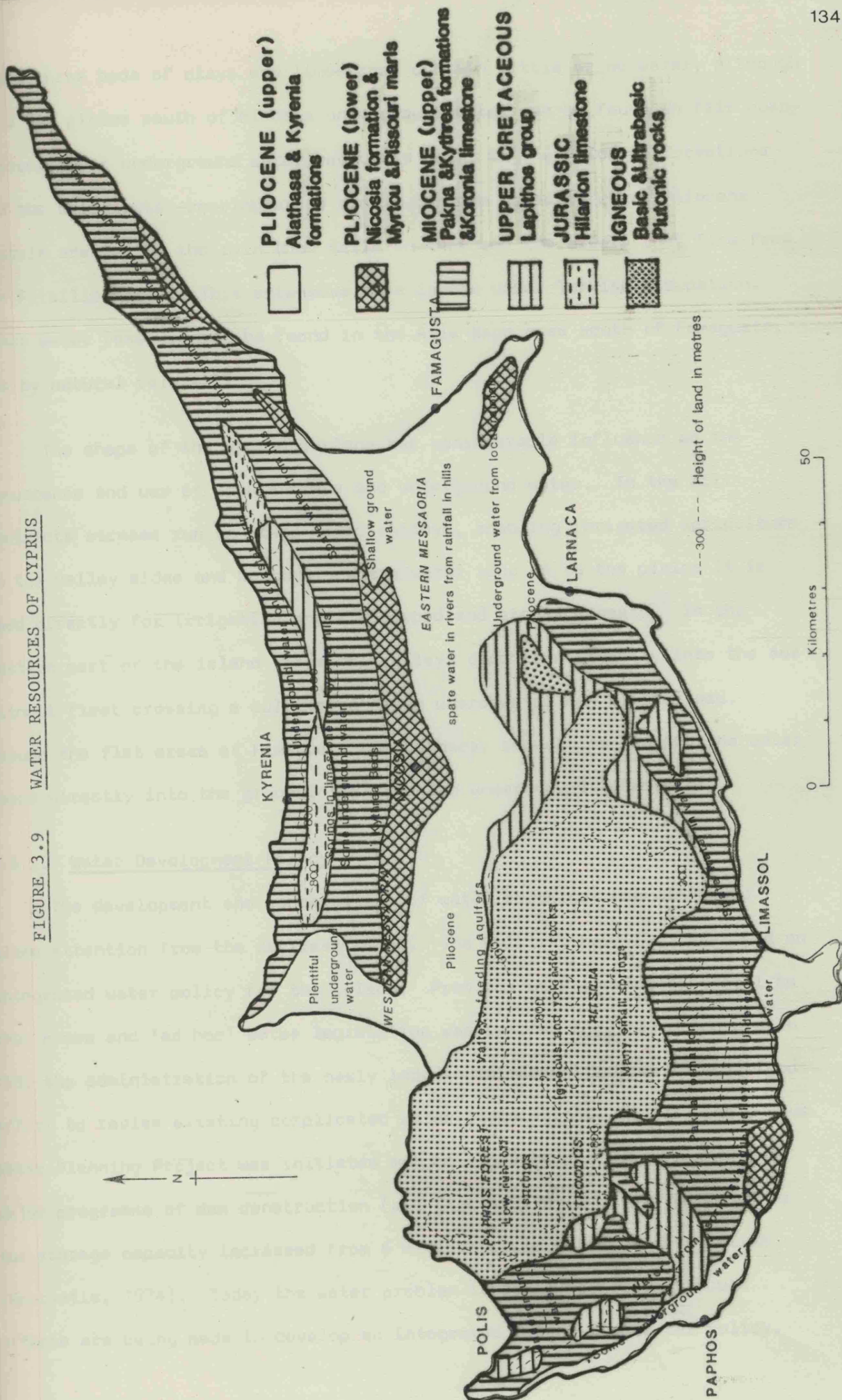
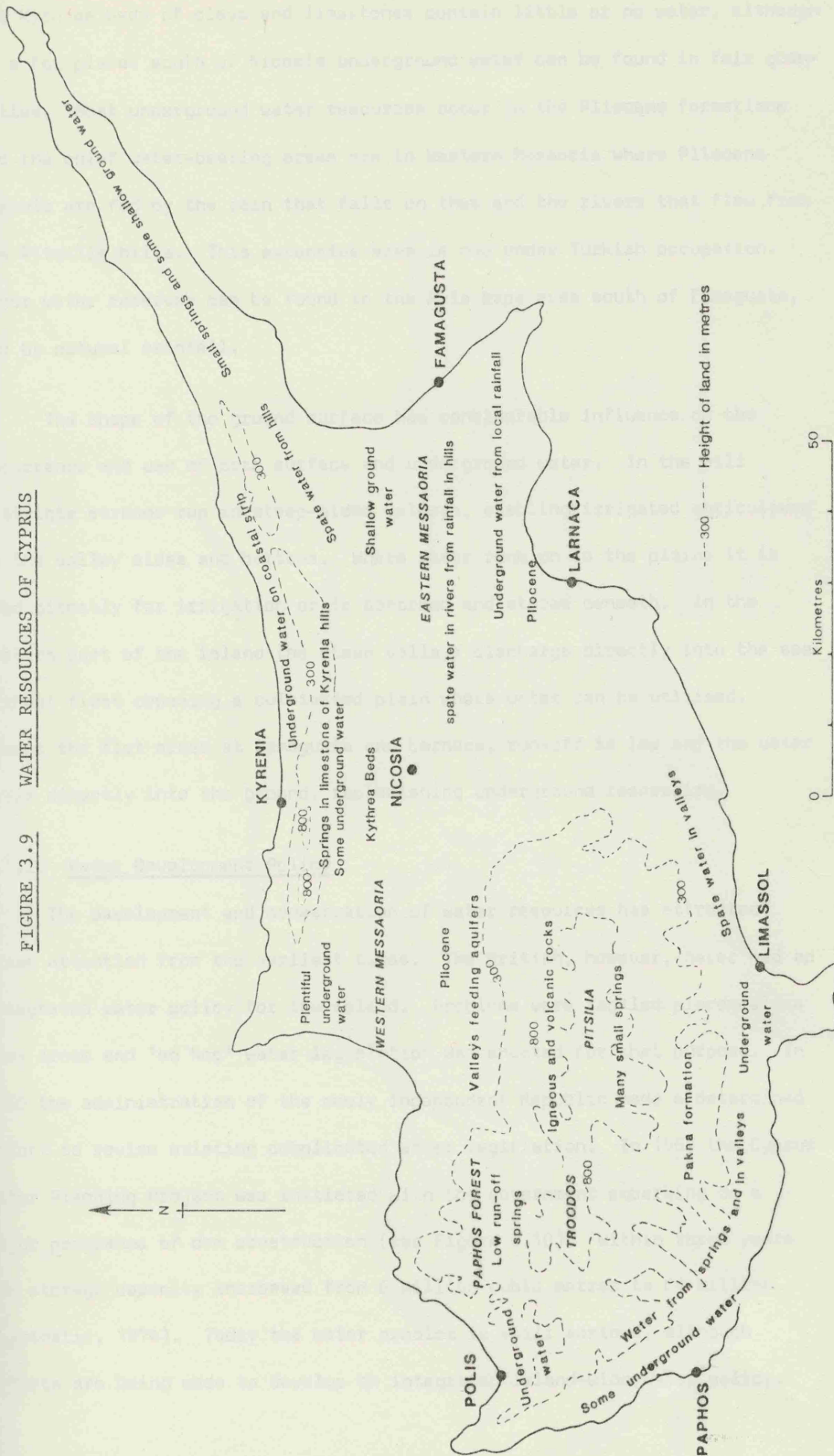


FIGURE 3.9 WATER RESOURCES OF CYPRUS



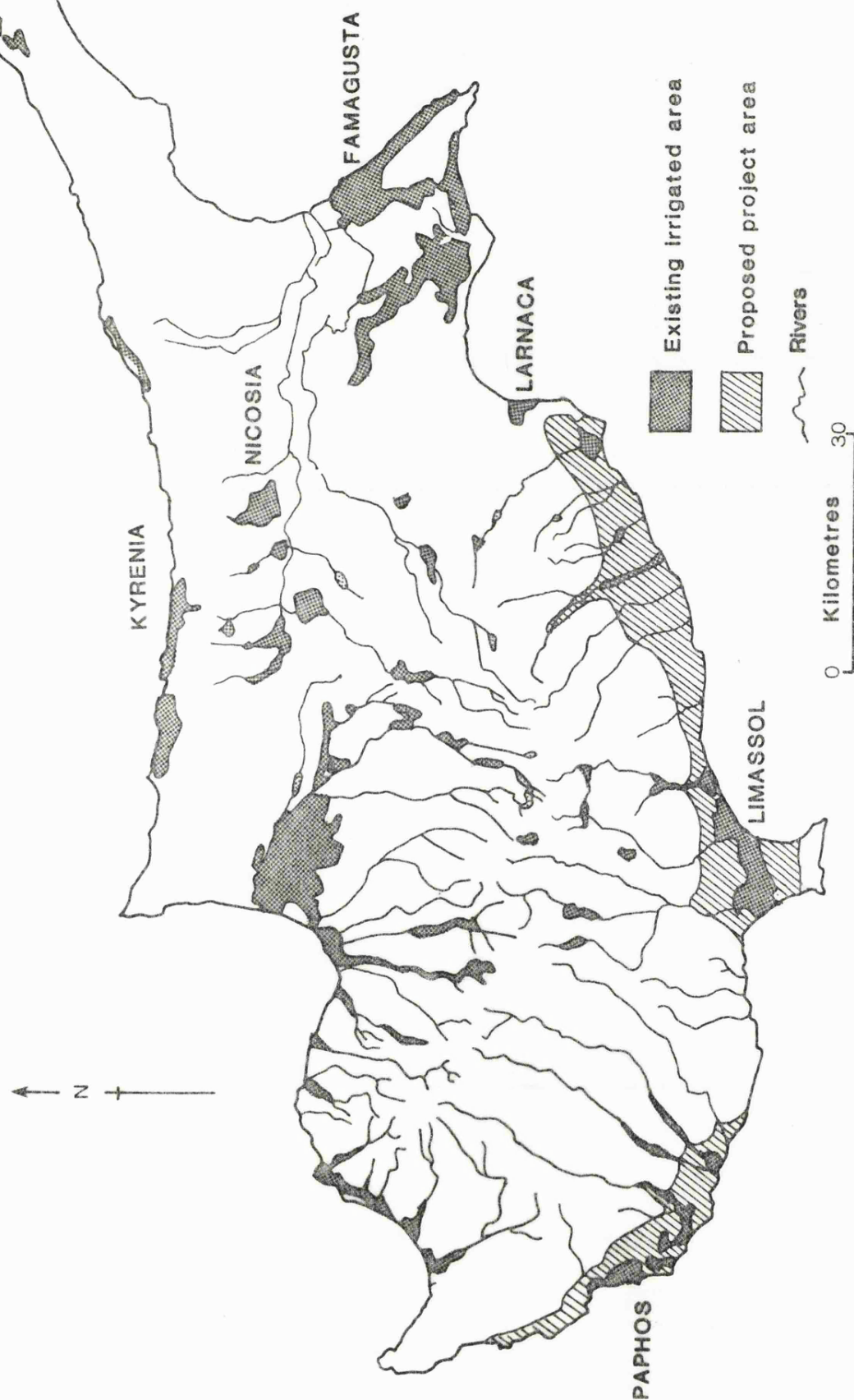
the Kythrea beds of clays and limestones contain little or no water, although in a few places south of Nicosia underground water can be found in fair quantities. Most underground water resources occur in the Pliocene formations and the chief water-bearing areas are in Western Mesaoria where Pliocene gravels are fed by the rain that falls on them and the rivers that flow from the Pitsilia hills. This extensive area is now under Turkish occupation. Other water reserves can be found in the Ayia Napa area south of Famagusta, fed by natural rainfall.

The shape of the ground surface has considerable influence on the occurrence and use of both surface and underground water. In the hill districts streams run in steep-sided valleys, enabling irrigated agriculture on the valley sides and bottoms. Where water runs on to the plains it is used directly for irrigation or is absorbed and stored beneath. In the western part of the island the steep valleys discharge directly into the sea without first crossing a cultivated plain where water can be utilised. Around the flat areas at Famagusta and Larnaca, run-off is low and the water seeps directly into the ground, replenishing underground reservoirs.

3.5.2. Water Development Policy

The development and conservation of water resources has attracted close attention from the earliest times. The British, however, never had an integrated water policy for the island. Problems were tackled piecemeal as they arose and 'ad hoc' water legislation was enacted for that purpose. In 1960 the administration of the newly independent Republic made a determined effort to revise existing complicated water legislation. In 1967 the Cyprus Water Planning Project was initiated with the government embarking on a major programme of dam construction (see Figure 3.10). Within three years the storage capacity increased from 6 million cubic metres to 64 million (Konteatis, 1974). Today the water problem is still serious, although efforts are being made to develop an integrated island-wide water policy.

FIGURE 3.10 LOCATION OF MAIN IRRIGATED AREAS



However, administration and management are hampered by a chaotic and confusing system of private water rights which have deep historical roots. Water rights, like rights to land, are inheritable and over many generations the process of equal division to each and every heir has created a water tenure pattern that is frequently more fragmented than the land. In his famous book 'Bitter Lemons' Lawrence Durrell (1957) described the situation graphically:

"Water is so scarce in Cyprus that it is sold in parcels. You buy an hour here and an hour there from the owner of the spring - needless to say no quantity measure exists. The trouble lies here: that water rights form part of the property titles of citizens and are divided up on the death of the owner among his dependents. Families being what they are, it is common for a single spring to be owned by upwards of thirty people ... The whole problem is then one of common consent - usually one has to pay for the signatures of thirty people in order to achieve any agreement that is binding. Otherwise one dissident nephew or niece can veto the whole transaction. As may be imagined the most elementary litigation assumes gigantic proportions - which explains why there are so many lawyers in Cyprus."

Private rights exist on nearly all rivers and often act as a brake on agricultural improvement and development. For example, water distribution may be carried out according to a pre-determined time period and not to crop needs. The multiplicity of demands and rights often blocks and delays major water development projects. In one dam building operation the existence of a complicated pattern of water rights prevented use of dam water for eight years (Konteatis, 1974). Any new irrigation plan involves formidable legal, social and economic problems which, combined with poor physical sites, makes dam building in Cyprus the most costly in the world in terms of per unit volume of water stored. While the government does have authority to compulsorily acquire water rights the financial, social and political consequences prevent such action.

By far the major user of water is agriculture. Irrigated agricultural land has a high value both in terms of farm incomes and levels of productivity. Water development has, therefore, assumed a key role in agricultural improvement. Land under irrigation is only 8.7% of the total agricultural area, but this is slowly growing. Often irrigation practises are highly inefficient and wasteful. For example with traditional spate, furrow and basin irrigation water wastage may be as high as 80%. In 1965 a Water Use Improvement Project was initiated with the aim of improving water resources at the farm level through the encouragement and adoption of improved irrigation techniques. Although underground reserves, which supply 77% of irrigated areas, are in the hands of individuals, collective use of water is encouraged by the government promotion of Statutory Irrigation Divisions. However, much of the country's ground water resources is over-tapped with consequent problems of a lowering water table and salt water intrusion. A further expansion of the irrigated area is only possible through an increased use of surface water (Heinritz, 1977).

Increasingly agriculture is having to compete for water with other users. Industrial and domestic needs continue to grow at a dramatic rate - a result of massive rural-urban migration and touristic development. When agriculture is in direct competition with such users it is often the loser. The Turkish occupation of northern Cyprus disrupted the Republic's attempts at developing a Master Plan for water development and also created serious water shortages. Major irrigated areas in Morphou and Famagusta were lost and this has created a major water problem for the capital Nicosia which experiences stringent water rationing in the summer months.

The development of water resources has assumed major importance in the emergency plans for the recovery of the Cypriot economy after the Turkish invasion. Major objectives of this emergency planning were: an expansion of the total irrigated area by new dam building and water distribution systems; extensive surveying for new water reserves and the saving of addi-

tional water for industrial and domestic purposes. Long-term schemes include the Vasilikos-Pendaskinos Project, the Paphos Irrigation Project, the Pitsilia Integrated Development Project and the Southern Conveyor Project. A brief description of each of these four projects follows.

3.5.3. Major Water and Irrigation Projects

The £31 million Vasilikos-Pendaskinos irrigation and water scheme will be on stream by 1983. Partial funding has been provided by the World Bank, West Germany, Kuwait and the EEC. The project provides for the construction of two dams at Kalavasas and Dhypotamos on the Vasilikos and Pendaskinos rivers respectively. The dams will have a combined capacity of 32 million cubic metres. About half of the available water will be conveyed to Nicosia to alleviate the city's chronic water shortage. Most of the remainder will be for irrigation. Land consolidation is planned as an essential feature of this project.

The rather larger Paphos Irrigation Project was started in 1976 and is now nearing completion. By then a large section of the coastal plain around Paphos will be irrigated with water supplied by conveyors from a dam built on the Asprokremos river and also from some 30 boreholes. The aim of this project is to increase production of early fruit and vegetables. The cost is around £75 million with the World Bank putting up about £13 million of this. Integrated development has been the key to the project's implementation with conservation and consolidation works playing a significant role.

The Pitsilia Project, again funded by the World Bank, has a social rather than an economic basis. The aim here is to stimulate an economically depressed region by developing its productive resources and by improving its social services. The project is multi-sectoral and involves among other things, the development of irrigation through 70 minor schemes and a dam constructed at Xyliatos. The existing developed resources are around 11

million cubic metres (10 MCM for irrigation and 1 MCM for village domestic supplies). This represents only 13% of the total surface water potential of 88 MCM. The ground water potential, only partly known, is estimated at 3 million cubic metres. Where on-farm water distribution systems are to be developed land consolidation is seen as a pre-requisite although it is limited to new irrigated areas of at least 200 donums. The rationale of consolidating only part of the newly irrigated area is that the necessary skilled manpower cannot be made available (World Bank, 1977).

The Southern Conveyor Project, the fourth major scheme, is an ambitious attempt to transfer surplus water from the western parts of the island to the east where demands are greatest. At the present time the project is at the preparation stage. A major factor necessitating the introduction of this project is the current water shortage of the Kokkinochoria (or 'red villages' - named after the local red soil) region, one of the richest agricultural areas of Cyprus. The project is also aiming to supply water to Nicosia, doubling the available domestic water per head. Water will be fed to Mari for industrial purposes and there will be created 'en route' selected zones of irrigation. At least 63% of the total water transferred will be used for agricultural purposes. Costs are estimated at around £90 million to be financed by the World Bank and other organizations. Land consolidation is again an essential part of this project.

3.6. LAND CONSOLIDATION IN CYPRUS

It was recognised early on during the British occupation that the defective land tenure structure of Cyprus was a major constraint to the island's agricultural development (Surridge, 1930). However, little was done to remedy the situation, although land consolidation was suggested as a policy solution early in 1944 (Lantis, 1944). As outlined in more detail above (see section 3.3.1), the 1946 Immovable Property Act did indicate some kind of limited government response. This contained provisions which

attempted to eliminate dual and undivided ownerships and prevent further fragmentation by specifying minimum plot sizes, but generally the law was weak and ineffective.

Before independence the only appreciable effort at the introduction of land consolidation came with the establishment of a land consolidation section with the Department of Agriculture. Prior to this event the discussion of the issues of land consolidation was of a sporadic, incidental and rather academic nature. The new land consolidation section, under the initiative of Demetrios Christodoulou, undertook research into the land tenure structure of Cyprus (Christodoulou, 1959; 1974) and a consolidation plan was prepared for a case study at Anayi village, near Nicosia (Georgiades, 1952). A draft bill on land consolidation was gradually developed. But even this effort in the mid-1950s died away as political problems associated with the struggle for independence assumed greater importance.

After 1960 and the establishment of the Republic the constraints of the land tenure system were once again in evidence as an attempt was made to develop the economy (Republic of Cyprus, 1962). The idea of launching an overall programme of land consolidation gathered momentum in the following years and, in 1962, the Cyprus government invited an FAO expert to carry out an in-depth study of the situation with a view to determining methods of solving the acute problems of farm structure.

In his report to the government of Cyprus, Van der Zachen of FAO described the nature of the land consolidation problem and possible solutions. He estimated the costs and benefits involved, mentioned some of the basic principles which should be included in land consolidation legislation and made an outline of the legal procedure to be followed (Van der Zachen, 1963). In 1964 a Draft Bill was prepared along the lines of the FAO report. The bill received substantial alterations by the various government departments directly or indirectly concerned with land consolidation. This

accounts for the lack of unity of conception which is now evident in the text of the law. The bill was enacted in 1969 as Land Consolidation Law No. 24. Several amendments of varying degrees of importance have since been introduced.

3.6.1. The Operation of the 1969 Land Consolidation Law

Although fairly comprehensive and to a great extent self-supporting, the land consolidation law must be seen within the context of several other enactments, some of them introduced during the colonial era, which in one way or another relate to land-use in general and land consolidation in particular. Nevertheless, the act itself was seen as "an historic breakthrough in the sense that the reform of the agrarian structure will assume now a deliberate and systematic form backed by comprehensive legislation and institutional framework as well as by an obligation to the state to provide financial support." (Masrévéry, 1974).

A pre-requisite to the implementation of the land consolidation programme in Cyprus was the establishment of an adequate administrative machinery. Initially consolidation matters had been handled by a specialised unit of the Ministry of Agriculture but it soon became clear to the authorities that, if any real impetus was to be given to land consolidation schemes, it would be necessary to transfer all authority to an autonomous corporate body vested with special powers of control and co-ordination. As a result the law of 1969 provided for the establishment of an independent Land Consolidation Authority (L.C.A.) as the executive organ of the land consolidation programme as a whole. The L.C.A. is assisted by several other executive units which are dealt with by the law as well as by later regulations enacted in 1973.

The L.C.A. is entrusted with the prime responsibility for carrying out the 1969 Act. The authority functions as an inter-departmental organ responsible for the co-ordination of the actions and operations of the

various bodies involved in land consolidation. It is chaired by the director-general of the Ministry of Agriculture and Natural Resources and has representatives from other departments as well as farmers. The authority has the power to compulsorily acquire, purchase and sell land. It has established an executive body - the Land Consolidation Service (L.C.S.), which has its headquarters in Nicosia and district offices in Larnaca, Limassol and Paphos. At the individual scheme level Land Consolidation Committees are established, consisting of representatives from government departments and elected representatives from owners. The committees are decision-making bodies and supervise and approve the various plans.

In simple terms land consolidation in Cyprus is an exchange of properties based on values estimated at current market prices. The primary objective is the modernization of the farm structure and the creation of 'viable' holdings with access (Land Consolidation Authority, 1976, p. 20). Specific measures include: the regrouping of fragmented holdings into compact ones; the expropriation of holdings below a certain minimum size; the enlargement of holdings and the rationalization of plot shape; the abolition of dual and multiple ownerships; the construction of a modern farm road network giving access to all plots; and land improvement, drainage and irrigation works. These measures are expected to allow: a more rational use of the land; an increase in land and labour productivity; a decrease in the costs of production; an increase in farm family incomes and a rise in the general standard of living; and the establishment of the pre-conditions for the encouragement of group farming (Land Consolidation Authority, 1976, p. 8).

The procedure for land consolidation is time consuming and laborious. The many stages are listed in detail in Appendix A and are discussed briefly below.

When a group of farmers shows an interest in land consolidation a meeting is held under the chairmanship of the District Officer. If a major-

ity is in favour a preliminary committee is established which proceeds to delineate the area likely to be consolidated and requests from the Department of Lands and Surveys a list of owners. When the above list is provided and finalized a new meeting or 'First Meeting' is held by the so-called 'entitled owners' (an entitled owner is any person who owns within the land consolidation area an agricultural holding worth not less than £CY2; thus very small shareholders may be eliminated from the decision-making process). If, during such a meeting or subsequently, the majority of the entitled owners, who also own properties which in aggregate account for more than half the total assessed value of the area, vote in favour of land consolidation, then a 'land consolidation area' is established. The resolution is binding to all owners, entitled or not, and is irrevocable except by an order of the Council of Ministers.

Next, a 'Valuation Committee' is set up comprising farmers and government officials who undertake the valuation of all properties within the land consolidation area on the basis of their market value. A list is prepared showing each owner with the total area of his properties and their total value. On the basis of this valuation, land redistribution is carried out on the following principles (which may not be achieved in all cases). 'Small' holdings are allocated only one plot, 'medium' holdings two plots and 'large' holdings three plots. Small holdings below a certain minimum size are compulsorily acquired by the L.C.A. and used to enlarge other holdings. The compensation paid is the market value of the property concerned. In exceptional cases certain properties may be exempted from redistribution, i.e. buildings with high values, properties with installations or plantations (especially citrus) or lands which "possess a distinct character and high value and their owners take special care and interest in their utilization" (Republic of Cyprus, 1969, p. 22). After land consolidation all plots must be readily accessible and no holdings or plots may be allocated in undivided shares except in special circumstances. Trees

and water owned by persons who own no land may be compulsorily acquired and used to enlarge holdings. 'Preference sessions' are arranged during which owners can indicate preference for the location of their new holdings. As far as possible such allocation is done in accordance with these expressed preferences. After the new plots are allocated they are demarcated and registered in the names of their new owners and title deeds are issued. This final act marks the last phase of the land consolidation project.

On the financial side the costs payable by the farmer include roads, land improvement and irrigation works. A government subsidy of 50% of the cost is available to the farmer and the remainder is paid off over an 8-year period at $4\frac{1}{2}\%$ interest. Cost of the land taken up by the new road network is shared proportionately by the owners in the land consolidation area and their share is deducted from the total value of the land to be distributed. Land acquired by the L.C.A. through purchase or compulsory take-over in the course of the land consolidation process is paid for in cash by the L.C.A. and sums are recovered in instalments from the farmers whose holdings are enlarged. The Water Development Department is responsible for the primary and secondary irrigation networks, while the Department of Agriculture is responsible for the soil conservation and water-use aspects of the scheme.

The application of land consolidation is democratically carried out (see Appendix A). Owners have a right to object at all stages and, as a final step, they can resort to the courts. Although provisions do exist for compulsory consolidation where extensive irrigation or soil conservation projects are planned, land consolidation has so far only been applied on a voluntary basis. Extensive campaigns of 'enlightenment' are carried out utilising mass media and other information sources (e.g. posters such as that portrayed in Figure 2.1) in an attempt to secure a positive attitude towards consolidation.

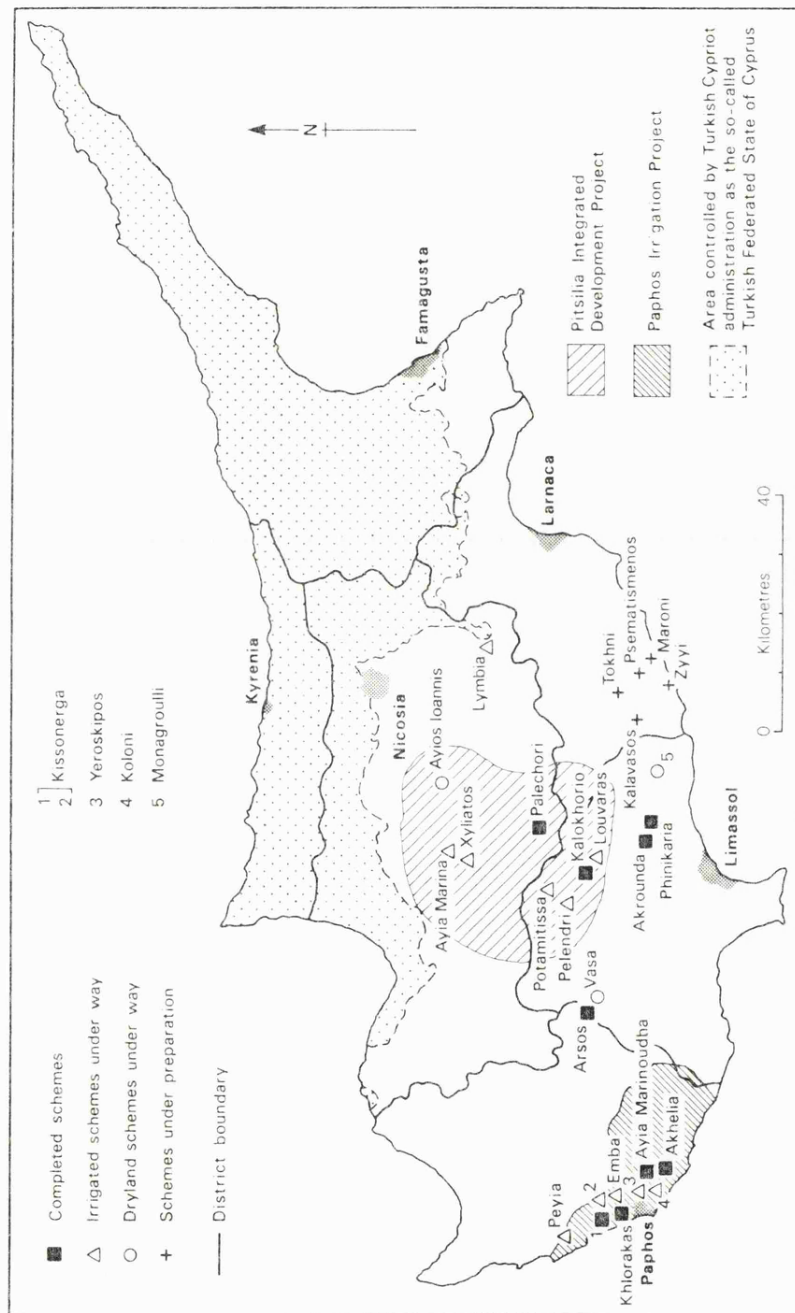
3.6.2. Growth of the Land Consolidation Service

The progress of land consolidation in Cyprus has been fairly rapid. Projects now cover a total area of 61,588 donums. Personnel within the service have increased from 14 in 1969 to 61 in 1980 and include staff who have spent short periods training abroad. The annual budget has risen from £CY6,000 in 1961 to £CY375,300 in 1980. This has allowed the service to continually expand its activities. Two distinct phases of operation are evident.

The primary phase of consolidation work occurred between 1969 and 1974. This was conceived as a 'pilot stage' designed to test the general reaction of the farming population and to provide the necessary experience for future developments. After an extensive campaign of enlightenment a total of five villages - Kissonerga, Khlorakas, Phinikaria, Akrounda and Palechori - were selected. These were all situated in rain-fed areas which were subsequently irrigated. The schemes, covering various parts of the total village areas, involved some 1,253 owners and covered a total area of 5,488 donums over a variety of terrain ranging from flat lowland to mountain valleys. The location of these schemes is shown in Figure 3.11. All schemes were applied voluntarily; the average rate of acceptance was 71%.

The second phase of consolidation covers an area of 56,050 donums and includes schemes both completed and underway. It differs considerably from the earlier stage. Schemes have been diversified to include the total administrative area of the village and extended into dryland areas. The close involvement of the Land Consolidation Service with current development projects has resulted in the spatial concentration of schemes in areas defining the Paphos Irrigation and Pitsilia Integrated Development Projects (see Figure 3.10 and section 3.5.3). Recently completed schemes include Akhelia and Ayia Marinoudha (Paphos District) and Arsos and Kalokhorio (Limassol District). A further 14 villages contain schemes in progress and another 7 villages are at the preparation stage (Figure 3.11).

FIGURE 3.11 LOCATION OF LAND CONSOLIDATION SCHEMES



3.6.3. Water Development and Land Consolidation

In established irrigated areas land consolidation implementation faces severe difficulties. However, in any new irrigation scheme, land consolidation becomes a pre-requisite for rational water use (see section 3.5). The reasons for this apparent anomaly can be interpreted as follows.

Since water is a scarce resource in Cyprus, irrigated land assumes a 'special' value to the farmer. The strong wish to hold and acquire irrigated land, coupled with the system of partible inheritance, has meant that such land is often highly fragmented. The multiplicity of interests, high land values, established permanent crops and a sentimental attachment to the land and to water sources all mean that in an irrigated environment any consolidation is costly, difficult and time consuming.

Until very recently land consolidation had not been attempted in irrigated areas, even when they fell within the boundaries of a particular project, and in spite of the fact that such areas would benefit considerably. However, a unique attempt has been made at Ayios Ioannis, the first dryland scheme in Cyprus, to tackle the existing fragmentation of land and water rights simultaneously. Here a local irrigation system of a chain-of-wells is to be found. Minute shares of water rights exist as well as designated period of use. The consolidation of water rights involves a restructuring process with the re-allocation and concentration of time periods of use, the expropriation of very small shares and the re-allocation of water rights with land. The success of this attempt may provide the base for future land consolidation operations in irrigated areas.

Evaluation studies carried out before the implementation of major irrigation projects have demonstrated that the land consolidation process improves water distribution at the farm level, minimizes wastage and reduces the total cost of the irrigation operation (see Table 3.14). More importantly, it provides the necessary structure for the effective utilization

TABLE 3.14

COMPARISON OF COSTS OF IRRIGATION BEFORE AND AFTER LAND CONSOLIDATION
FOR KOLONI SAMPLE AREA (PAPHOS IRRIGATION PROJECT)

Item	Unconsolidated £/ha.	Consolidated £/ha.
Supply and Installation of Pipes and fittings	106.4	83.0
Valves	19.7	18.1
Outlet Hydrants	73.0	53.0
Main Line	45.1	41.6
Total	244.2	195.7

Source: Paphos Irrigation Project: Feasibility Study Main Report,
 Vol. 5, Part A, p. 5.

of the new water resource.

3.6.4. The Effects of Land Consolidation

No thorough evaluation of the land consolidation process in Cyprus has previously been attempted. However, certain structural changes at the farm level are immediately obvious and these are often cited by the L.C.A. in its publications (see especially the L.C.A.'s Annual Reports, 1975 - 82) as the proof of the success of the consolidation process. Unfortunately, this has tended to obscure more fundamental social and economic effects which form the focus of this investigation. Nevertheless, the structural changes themselves are often impressive. Data relating to the first five completed pilot schemes are presented in Table 3.15.

If the total changes in average structural conditions for the five schemes are considered, the following observations can be made: the number of holders was reduced by 27%; absentee ownership was reduced by 37%; mean holding size increased by 53%; the total number of plots was reduced by 63%; mean plot size increased by 126%; plots held in undivided shares were reduced by 88% while land held in dual ownership was reduced by 100%; the number of 'pygmy holdings' (those below 2 donums) fell from 603 to 32; new roads provided access to every plot and the total road network length increased by 250%; and plots became more rectangular and were laid out in a more rational fashion taking into account the nature of the underlying topography. Land-use changes, monitored shortly after the completion of schemes, have been quite marked: uncultivated land has decreased from 25.9% of the area to 8.4%; vegetables have increased from 27.5% to 33.3%, bananas from 1.9% to 6.7% and citrus orchards from 0.6% to 2.4%. These structural and land-use changes for first-phase schemes will be analysed in greater detail in Ch. 6.

At the present time information is only available for three of the four schemes completed during the second phase of the consolidation programme (Table 3.16). One of these schemes, Akhelia, differs from the other

TABLE 3.15COMPARATIVE DATA FOR FIRST PHASE CONSOLIDATION SCHEMES

Variable	Palechori		Kissonerga		Khlorakas		Akrounda		Phinikaria	
	B	A	B	A	B	A	B	A	B	A
No. of Owners	319	189	395	214	278	204	164	103	97	63
Ave. Holding Size (donums)	3.1	5.3	4.7	7.5	5.2	6.9	4.0	5.3	5.1	7.3
Ave. Plot Size (donums)	1.6	4.4	1.7	4.8	3.0	5.2	1.4	3.8	2.9	5.8
Ave. no. of Plots Per Owner	2.0	1.2	2.7	1.6	1.7	1.3	2.8	1.4	1.7	1.3
Total no. of Plots	635	225	1053	334	466	268	466	144	171	79
% Plots held in Undivided Shares	10.3	0.0	24.9	1.8	17.5	0.1	23.8	1.2	30.4	7.6
% Holdings in Undivided Shares	27.7	0.0	51.7	2.4	37.2	0.7	31.7	0.7	12.7	5.7
% Holdings in Joint Ownership	0.0	0.0	0.0	0.0	15.1	0.0	58.6	0.0	97.9	0.0
% Plots without Title	14.3	0.0	15.2	0.0	23.3	0.0	18.7	0.0	22.8	0.0

Note: B = Before; A = After Consolidation.

Source: Land Consolidation Authority, Nicosia.

TABLE 3.16COMPARATIVE DATA FOR SECOND PHASE CONSOLIDATION SCHEMES

Variable	Kalokhorio		Arsos		Akhelia	
	B	A	B	A	B	A
No. of Owners	85	68	970	632	4	12
Ave. Holding Size (donums)	4.9	5.6	7.4	10.8	10.2	10.0
Ave. Plot Size (donums)	3.1	5.4	1.8	7.1	10.2	10.0
Total no. of Plots or Shares	134	70	4082	968	4	12
% Plots with Road Access	25.2	100	22.4	100	0.0	100
Length of Road Network (miles)	1.3	4.6	21.0	60.5	0.0	0.6

Note: B = Before; A = After Consolidation

Source: Land Consolidation Authority: Annual Reports 1979 and 1980

consolidation projects since it involves the purchase and re-distribution of church and government land to four small landholders and eight landless farmers. The effects of this scheme are not typical of the second generation projects and are excluded from the analysis below.

In this second phase the total number of holders was reduced by 27%; mean holding size increased by 30.4%; the total number of plots was reduced by 62%; mean plot size increased by 188.2%; plots held in undivided shares or dual ownership and pygmy holdings were abolished; new roads provided access to every plot and the total road network increased by 220.9%. Changes in land-use have not yet been significant due to the newness of the schemes. However, in Arsos, a vine area, changes in crop type are unlikely while in Kalokhorio and Ayia Marinoudha, where land consolidation was combined with irrigation schemes, such changes are expected.

It is worth noting that the Arsos scheme, one of the largest undertaken in Cyprus and the first to attempt land consolidation in a grape-producing region, created considerable problems for the Land Consolidation Service. The intricate and minute pattern of plots, the large number of owners, the strong personal preference for individual plots and a negatively skewed age structure all combined to make the process of persuasion and re-distribution a difficult, time-consuming and costly operation. It is unlikely that land consolidation will be attempted in such areas in the near future.

3.6.5. Evaluation of Land Consolidation: Some Problem Areas

A more detailed evaluation of land consolidation is presented in later chapters. However it is important to discuss here some of the problems and successes of the Cypriot consolidation schemes at a more general level.

Land consolidation activities were considerably hampered by the Turkish invasion of 1974. The division of the island, 40% in the north to the Turks and the remaining 60% in the south to the Greeks, has effectively curtailed

any attempt at a comprehensive island-wide approach to land consolidation. Plans for consolidation of villages in the north have had to be shelved. Ex-Turkish villages in the south hamper attempts at integrated land consolidation at a regional level since these lands are not available for consolidation because their legal owners have migrated to the Turkish-held north. These lands are usually rented out at a nominal rate to Greek Cypriots, often refugees from the north; although the existence of 'user' rather than 'ownership' rights effectively stifles any land improvement or development.

One problem that the Land Consolidation Service continually faces is the attempt to create 'economically viable holdings', one of its stated objectives. According to the 1969 consolidation law the L.C.A. has to determine every year for each land consolidation area the size of an economically viable holding. This is done by estimating the minimum income that a holding should yield to a farmer. In 1980 this was £CY2,900. Table 3.17 shows the small amount of land available for enlargement and the limited success that land consolidation has had in this field. Only Kissonerga shows a significant number of economically viable holdings.

For a holding to become economically viable there must be a change in the nature of production, in the level of productivity or in the size of the unit. Unexploited land is of no great significance in Cyprus and requires considerable investments to improve its condition and so land required for farm enlargement must come through a reduction in the number of owners. For social and political reasons land consolidation has low minimum levels of holding size and, more seriously, has no statutory powers to acquire large holdings or land belonging to absentee owners. Moreover, since land values increase after land consolidation people are even more reluctant to part with their land. Holdings that are not economically viable may result in low farm incomes, poor farm management, low levels of technology, leading to part-time farming and absentee ownership. The assumption that land consolidation is a panacea for the problems of agricultural production must therefore be dis-

TABLE 3.17LAND AVAILABLE FOR ENLARGEMENT AND THE CREATION OF ECONOMICALLYVIABLE HOLDINGS: FIRST PHASE SCHEMES

Scheme	% Area Available for Enlargement of Holdings	% Holdings Economically Viable After Consolidation
Palechori	18.6	5.7
Kissonerga	7.0	29.8
Khlorakas	0.5	17.1
Akrounda	4.5	4.1
Phinikaria	8.6	11.6

Source: Land Consolidation Authority: Annual Report 1979

missed. A 'consolidated' landscape must not be viewed as an entirely rational layout, but as representing a balance between various social and economic forces.

While land consolidation may appear to have some success at solving spatial problems of land tenure other important social and institutional problems exist. Conflicts of interest are often created because under prevailing legislation land consolidation is more of a technical and mechanical process than a broad socio-economic policy. Desires for technical perfection can often result in the non-recognition of the human element. An example of this was related to me by an officer in the L.C.A. in Nicosia, as follows. An old woman continued to visit the L.C.A. headquarters in Nicosia to complain bitterly about a tree that she had lost after the land consolidation process. She would often break down in tears but her words fell on unsympathetic ears - after all, what was one tree? She had been paid its monetary equivalent! Finally, a more sympathetic official learned the true reason for her distress. This single tree had a tremendous significance in her life for under it, whilst working in the fields, she gave birth to a son, a son she had waited fifteen years for. After only five months the child died and the living tree was all that remained of the memory. Had officials been more open to her objections at an earlier date then perhaps something could have been done. The rigidity of the land consolidation process can, and does, cause great distress. At the present time there is a group of extremely dissatisfied owners who continue to claim that land consolidation was unfair. Claims have been filed but the courts are reluctant to make a decision because of the tremendous implications for existing land consolidation schemes.

Land consolidation is both a costly and a time-consuming process. Table 3.18 shows the time period taken to complete the five pilot schemes and the cost of each scheme. Both time and cost are dependent on a number of variables including the experience and size of the personnel employed,

TABLE 3.18

COST AND TIME PROFILES FOR FIRST PHASE CONSOLIDATION SCHEMES

Scheme	Area (donums)	Total Cost (£CY)	Cost Per donum (£CY)	Preliminary Meeting	First Meeting of Entitled Owners	Assumption of Ownership	Titles Delivered to Owners
Kissonerga	1609.5	32,628	20.27	Aug. 1969	Mar. 1971	June 1974	1977
Palechori	982.4	25,566	26.02	Nov. 1969	July 1972	Oct. 1974	1977
Khlorakas	1404.1	23,694	16.87	Apr. 1970	June 1972	June 1974	1976
Akrounda	543.3	20,844	38.36	Sept. 1970	Jan. 1972	Feb. 1974	1976
Phinikaria	458.0	15,699	34.28	Aug. 1971	July 1972	Mar. 1974	1977

Source: Land Consolidation Authority, Planning Section, Nicosia.

the total area of the scheme, the land-use and topography, the location of the scheme in relation to the main urban centres and the age structure of the owners. Numerous studies have demonstrated how one major cost item, roads, is a function of the size of the scheme and the type of terrain (Constantinou, 1974; Stephanou, 1973). Costs tend to decrease with increasing size of schemes. Average time for the assumption of new ownerships is two years. Considerable amounts of time are spent at the initial stage, preparing the list of owners before the delimitation of the area, because many of the records are out of date. Both the costs and time periods for consolidation of these pilot projects must not be considered typical of schemes in phase two. Costs may have been exceptionally high due to the inexperience of staff and other teething difficulties. The problem here is that while consolidation is in progress there may be considerable disruption of farming activities. What is needed is a simplification of the legal procedure and the introduction of new and faster consolidation methods (Andreou, 1975; Florides, 1975; Kerstang, 1978).

Finally, the problem of the refragmentation of consolidated land is particularly severe in the case of Cyprus. While consolidation is considered to be a dynamic process linked to the changing needs of society and technology, the experience of other countries with a long history of consolidation has shown that refragmentation can, and does, re-occur and that reconsolidation must take place. The rate of refragmentation in the Cypriot case is quite alarming. Data presented in Table 3.19 show the sub-division of plots in the first five schemes. The data relate to a period from 1974 to 1977 and show that within a relatively short time consolidated land is again being fragmented. In the majority of schemes this is a result of the operation of the dowry system. In the case of Kissonerga and Khlorakas changes have often been the result of competing land-use interests mostly from touristic developers. A more detailed evaluation of this problem is given in Ch. 6.

TABLE 3.19

REFRAGMENTATION OF CONSOLIDATED HOLDINGS: FIRST PHASE SCHEMES

Scheme	No. of Applications for Subdivision Approved	No. of New Plots After Subdivision					Reasons for Subdivision		% of Subdivisions Compared to Total No. of Plots
		2	3	4	5		Sale	Donation	
Palechori	15	12	1	2	0	2	10	3	7
Akrounda	6	4	1	1	0	0	5	1	4
Phinikaria	6	5	0	0	1	0	6	0	8
Kissonerga	11	9	1	1	0	1	9	1	3
Khlorakas	14	11	2	1	0	4	7	3	6

Source: Land Consolidation Authority: Annual Report 1979, p. 14.

CHAPTER FOUR

FRAMEWORK FOR THE RESEARCH

4.1 AN INVESTIGATION INTO THE PROBLEMS OF CYPRIOT AGRICULTURAL STRUCTURE

4.1.1 Basis of The Study

During a preliminary investigation of data contained in the 1977 Census of Agriculture using simple correlation coefficients, it was discovered that the structural difficulties inherent in the Cypriot system of agriculture are not represented by single or isolated causes but are expressed by relationships to many variables which in turn exhibit considerable variations in their distribution over geographic space.

A method was needed of analysing a large data set containing variables hypothesized to have some association with agricultural structure. Factor analysis was decided upon since it was a methodology that allowed both a test of the significance of particular variables and the identification of significant groupings of these variables in geographic space.

4.1.2. Method of Analysis

The computer program used in this study was Factor Analysis by the Principal Component Method and was run on the University of Leicester's Mainframe Cyber.

Factor analysis attempts to measure the relationship between a set of variables. It is performed on the 'similarity matrix' (the intercorrelations between a group of variables) and aims at reducing the dimensions of variation to be analysed in a data set. It is essentially a data transformation technique with a mathematical purpose - that of describing linearly each of the 'n' observed variables in terms of 'n' new uncorrelated factors, where each factor in turn makes a maximum contribution to the sum of the variance of the variables (Harman, 1967, p. 15). In more detail, the data set to be analysed has a total variance which is the sum of the individual variable variances. It has been shown that each variable can be represented by an axis or dimension of variability in space. Factor analysis transforms the 'n' dimensional variable space into a new 'n' dimensional component space such that each new set of axes, dimensions or components, are at right angles (orthogonal) to each other, and the first component or factor extracts the maximum amount of variance in the basic correlation matrix. Each successive factor extracts the maximum amount of residual variance i.e. the variance left over by successive factors.

In this study factor analysis is used as an exploratory tool. Four different analyses were carried out using different groups of variables. Those variables highly correlated with others in the group were excluded from the final analysis although a note was made of the relationship. A total of 38 variables were considered intuitively as being associated with the agricultural structure but after exclusions only 20 variables were finally used. Table 4.1 lists these 20 variables, together with their main intercorrelations with excluded variables. Data were input into the program from an existing data file where the rows, or cases, were the 24 agro-economic regions of Cyprus and the columns the 20 selected variables.

Eigenvalues associated with, and percentage variance extracted by, factors provide a measure of the importance of factors relative to each other. Since the initial solution of factor analysis contains orthogonal factors, the principal axis matrix represents the degree of agreement between variables and the general view expressed by that factor. Factor analysis is a closed

TABLE 4.1

FINAL VARIABLE LIST FOR FACTOR ANALYSIS OF AGRARIAN STRUCTURE

- 1 Average size of plot (donums).
- 2 Average area of operated land (donums).
- 3 % Holdings less than 10 donums in size.
- 4 % Holdings with more than 6 plots per holding.
- 5 % Land leased.
- 6 % Total cultivated area irrigated.
- 7 % Area uncultivated.
- 8 % Area barren.
- 9 % Area forest.
- 10 % Holders under 30 years of age.
- 11 % Holders 30-50 years of age.
- 12 % Holders 50-60 years of age.
- 13 % Holders over 60 years of age.
- 14 % Part-time farmers.
- 15 % Casual employees.
- 16 Number of agricultural tools per holder.
- 17 % Total cultivated area under vegetables.
- 18 % Total cultivated area under vines.
- 19 % Total cultivated area under fruits.
- 20 Number of sheep per holder.

INTERCORRELATIONS:

- Average size of plot: positively correlated (0.69) with average area of holding; negatively correlated with number of plots per holding (-0.51).
- % Holdings less than 10 donums in size: positively correlated (0.83) with % part-time farmers.
- % Land leased: positively correlated (0.57) with number of goats per holder.
- % Forest area: negatively correlated (-0.65) with % total cultivated area under cereals, positively correlated with number of goats per holder (0.86).
- % Total cultivated area under cereals: positively correlated (0.60) with % fallow; negatively cultivated (-0.86) with % total cultivated area under vegetables.
- % Holders 30-50 years of age: positively correlated with % part-time farmers (0.58).
- % Part-time farmers: negatively correlated with % full-time farmers (-0.96).
- % Casual employees: negatively correlated with % holders with more than six children (-0.60).

mathematical transformation and the number of factors equal the number of variables, in this case 20. Beginning with the first and most important factor, a number of factors must be extracted and retained for further consideration. It is desirable to extract only those factors that are meaningful, in the sense that they should not contain either trivial or error variance. A number of methods exist to aid the decision of how many factors to extract.

Firstly, only those factors with eigenvalues greater than one are extracted (Daultrey, 1976, p. 44). This is known as Kaiser's eigenvalue method and is based on Guttman's weakest lowest bond which states that all factors having eigenvalues of less than unity be excluded (since factors with low variance are accounting for less of the total variance than any one variable). As Table 4.2 shows, only the first five factors are significant, explaining nearly 80% of the variance in the data set. Cattell's (1965) suggestion that Kaiser's test of significance has deficiencies may be relevant here, since the number of variables falls outside the group $n = 25 - 50$ in which Kaiser's test functions best. But, as Figure 4.1 shows, Cattell's Scree Test indicates that three or five factors may be considered as significant. In this study five factors are investigated.

The factor diagram (see Figure 4.2) relates the factor scores on both Factor 1 and Factor 2 and indicates whether any significant groupings of cases (i.e. the 24 agro-economic regions) occur. Five clusters were identified and marked on Figure 4.2; three of these contained agro-economic regions which were spatially contiguous. As a result the analysis was carried a stage further using a program CHORO, which calculates and prints chloropleth maps from area-based data. Input was from a file of factor scores. Only the first five factor maps were considered.

4.1.3 The 'Meaning' of the Factors

An analysis of the variable loadings (see Table 4.3) allows an interpretation of the factor meaning. Only those variables significant

FIGURE 4.1 CATTELL'S SCREE TEST APPLIED TO CYPRUS AGRARIAN STRUCTURE DATA

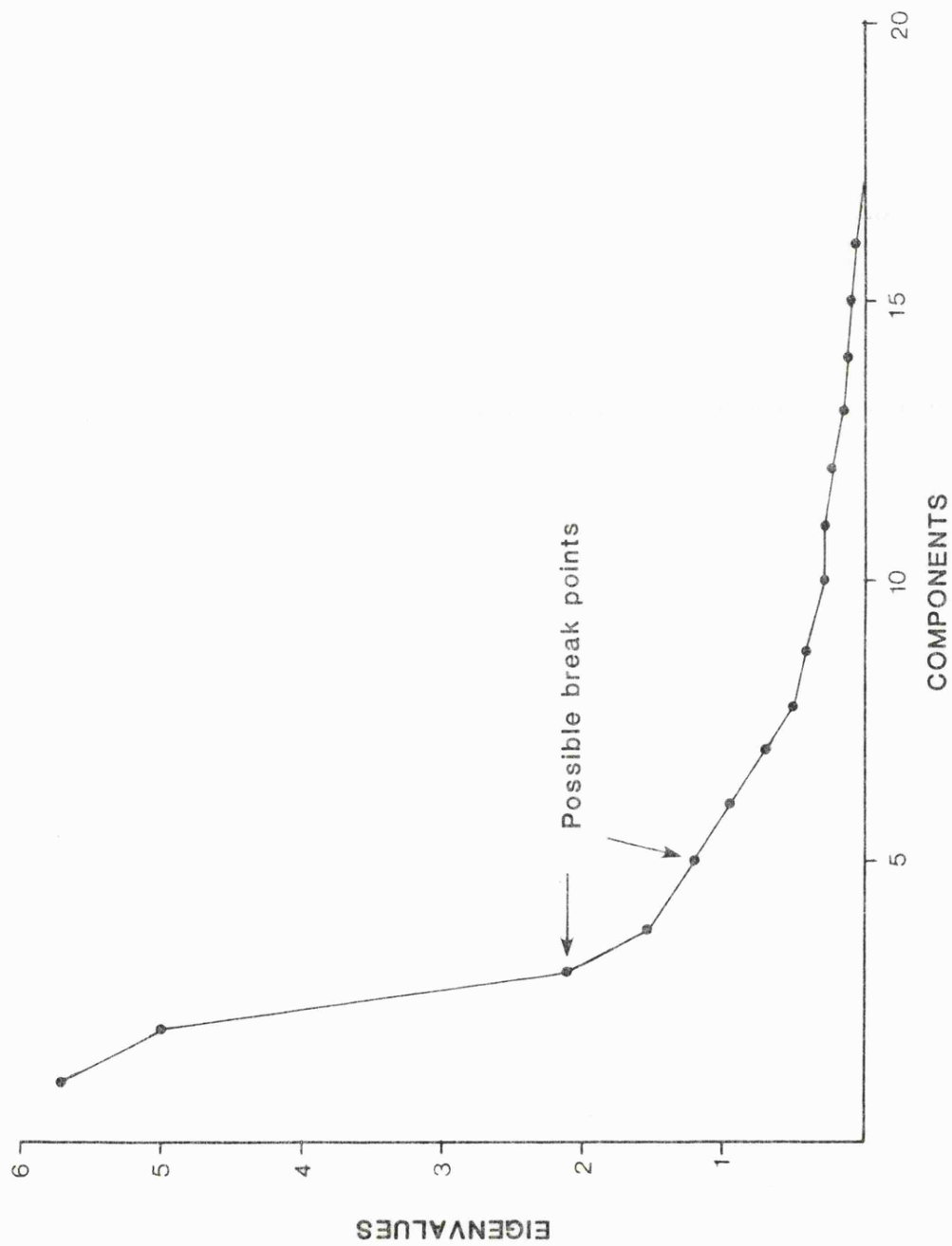


FIGURE 4.2 FACTOR DIAGRAM OF AGRARIAN STRUCTURE DATA

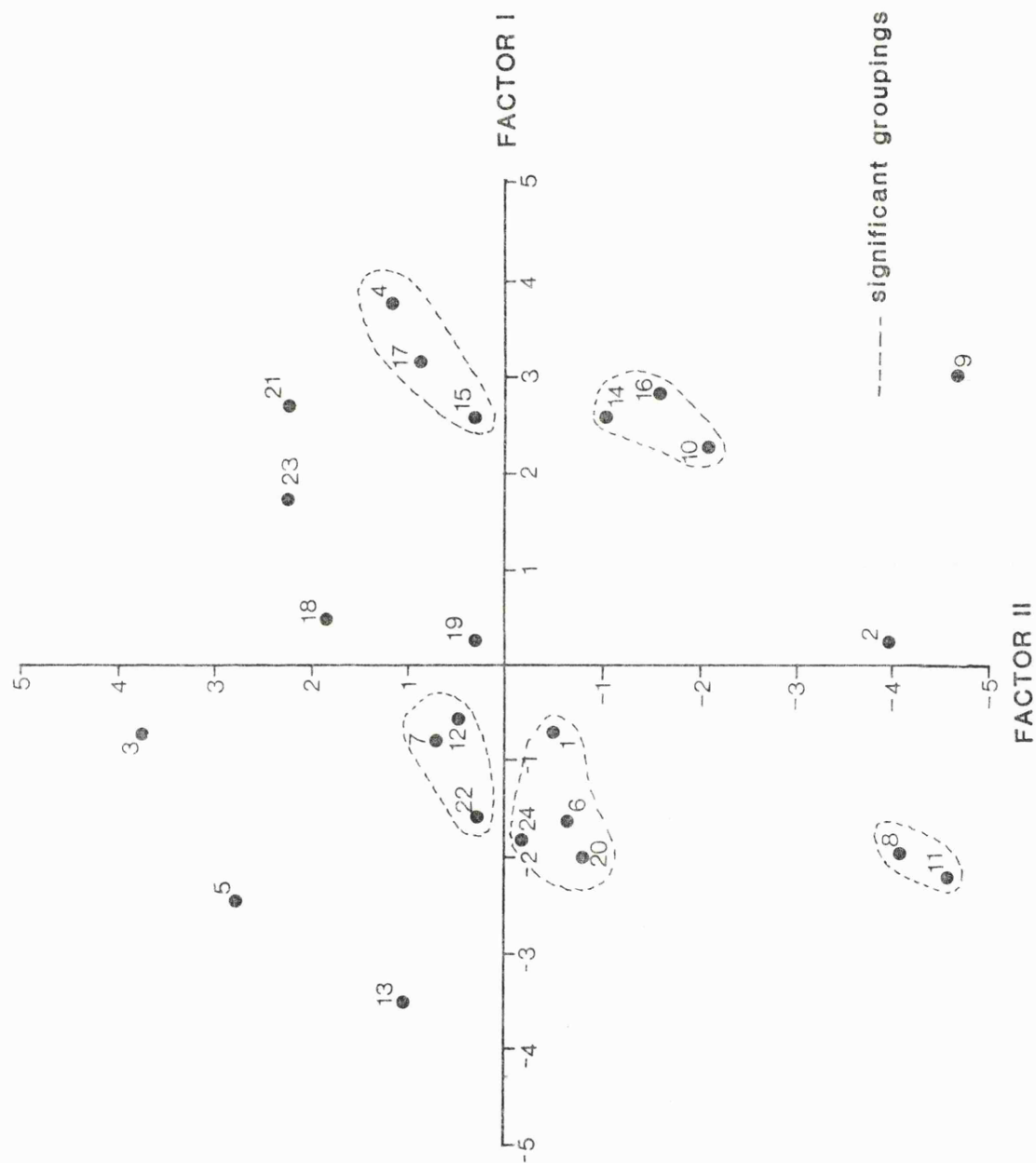


TABLE 4.2EIGENVALUES AND EXPLAINED VARIANCE

Factors	Eigenvalues	% Trace	Cumulative % Trace
1	5.771	28.853	28.853
2	5.008	25.042	53.853
3	2.179	10.895	64.790
4	1.708	8.538	73.328
5	1.233	6.167	79.496

6	.939	4.696	84.192
7	.705	3.523	87.715
8	.554	2.767	90.482
9	.456	2.281	92.763
10	.330	1.650	94.414
11	.309	1.545	95.959
12	.219	1.094	97.053
13	.180	.900	97.953
14	.148	.742	98.684
15	.102	.511	99.205
16	.060	.299	99.504
17	.048	.240	99.744
18	.029	.144	99.888
19	.015	.075	99.963
20	.007	.039	100.000

Notes: ----- Cut-off point.

The vectors are normalised so that sum of squares = 1

TABLE 4.3PRINCIPAL COMPONENT LOADINGS

Variable	FACTORS				
	1	2	3	4	5
1	-.406	.671	.036	.152	.565
2	-.076	.891	-.131	.174	.074
3	-.597	-.637	-.190	-.338	.084
4	.839	.006	-.103	.222	-.370
5	-.556	.628	-.169	-.216	.355
6	-.530	-.622	.290	.054	.076
7	.561	-.412	.325	-.057	.262
8	.275	-.475	.684	-.180	.162
9	.204	-.706	-.302	.146	.407
10	-.567	.053	.522	.458	.045
11	-.890	-.153	.004	-.195	-.129
12	.231	.315	-.776	-.256	-.005
13	.909	-.007	-.068	.001	.061
14	-.535	-.542	-.226	-.340	-.049
15	.555	.260	.342	-.432	.233
16	-.391	-.021	-.213	.728	.269
17	.105	-.650	-.327	.375	.270
18	.666	.126	.004	-.177	.311
19	-.173	-.709	-.234	-.242	-.072
20	.541	-.504	-.265	.086	.218

Note: For listing of variables see Table 4.1

at the 5% rejection level, i.e. with loadings of more than 0.425, were considered. Inspection of Table 4.3 reveals that Factor 1 has twelve significant variables, Factor 2 has eleven, Factor 3 has three, Factor 4 has three and Factor 5 has two. Variables that loaded lightly but did not contribute to the general group view of the factor were excluded from the interpretation. Variables excluded from the final analyses because of high correlations were included in the interpretation (see Table 4.1).

Factor 1 is characterised by high levels of fragmentation where the size of the operated unit is small, plot sizes are small and the availability of leased land for extra cultivation is low. Large amounts of land may be left uncultivated and the irrigated area is extremely small. The growing of vines and the rearing of sheep and goats are strongly associated with this factor. The typical holder is over 60 years of age, whose full-time occupation remains agricultural and whose land inputs are achieved through low levels of mechanization and high levels of family labour.

Factor 2 is characterized by large holdings where the sizes of both operated area and plot are large. Fragmentation is low. Leased land is readily available and both the uncultivated area and the irrigated area are small. The typical holder is between 50 and 60 years old and a full-time farmer engaged in some form of arable cultivation. Alternatively, Factor 3 is characterized by a group of young holders, less than 30 years old, without a direct interest in agriculture. Factor 4 also picks out a group of young holders, under 30 years old, but this time with a positive interest in agriculture, although commonly on a part-time basis. High levels of mechanization are associated with this group and have replaced, to some extent, other inputs of labour such as casual employees. Finally, Factor 5, which is rather like Factor 2, identifies owners with large holdings, plots and operated areas and with low levels of fragmentation.

The spatial information contained in the factors is presented in figures 4.3, 4.4, 4.5, 4.6 and 4.7 which are maps of the factor scores.

The factor score assesses the strength of an agro-economic region's agreement

FIGURE 4.3 FACTOR 1 MAP

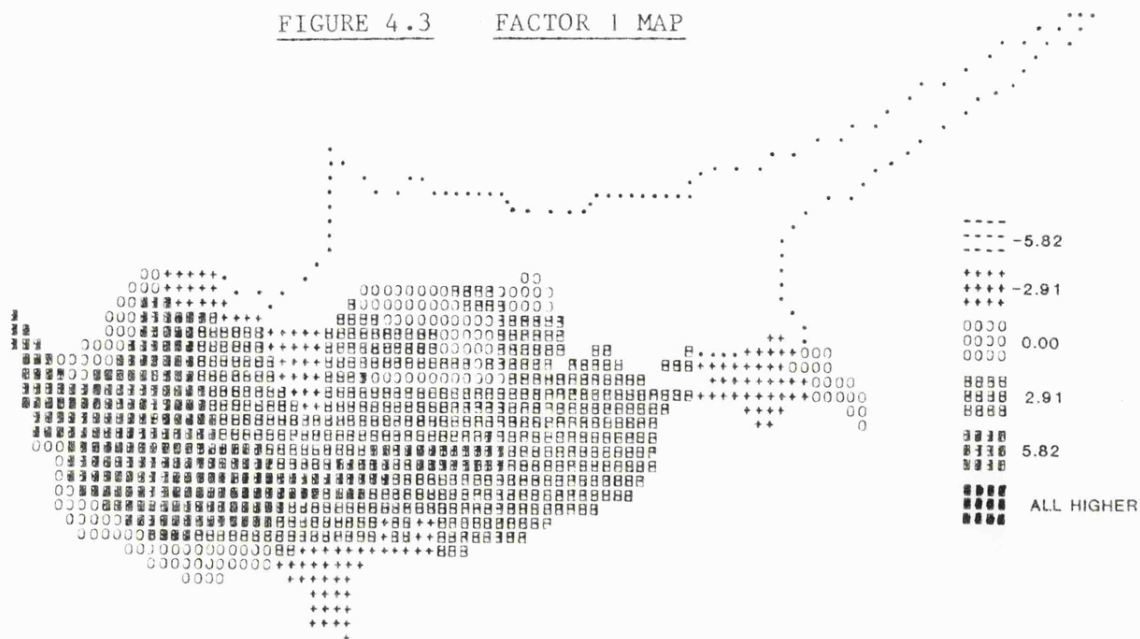


FIGURE 4.4 FACTOR 2 MAP

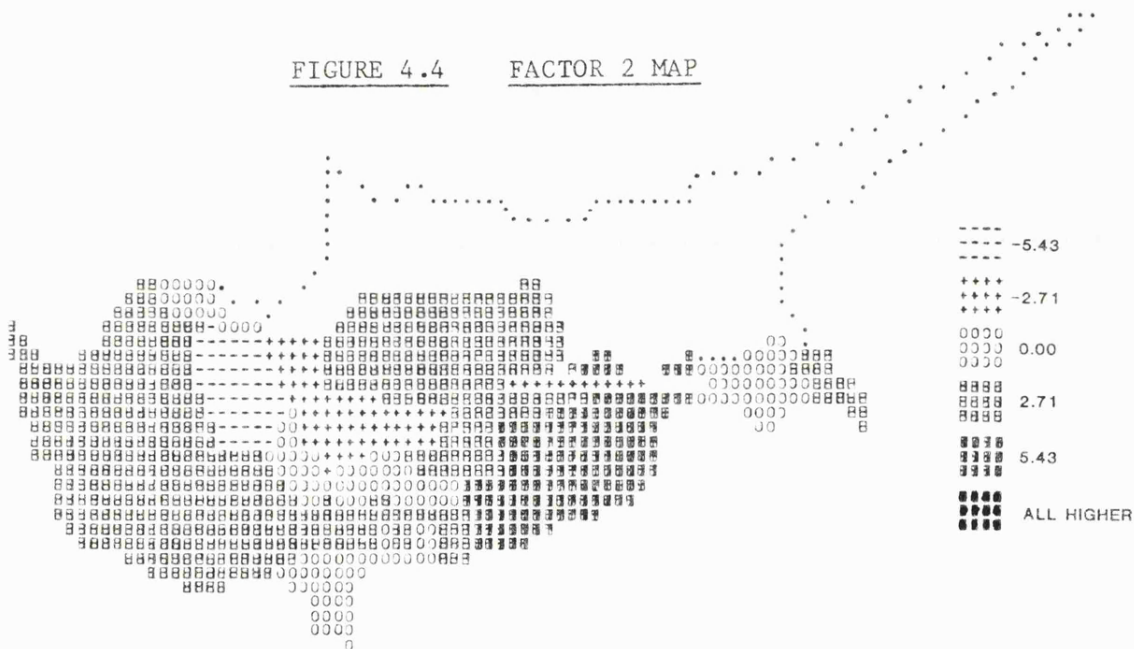
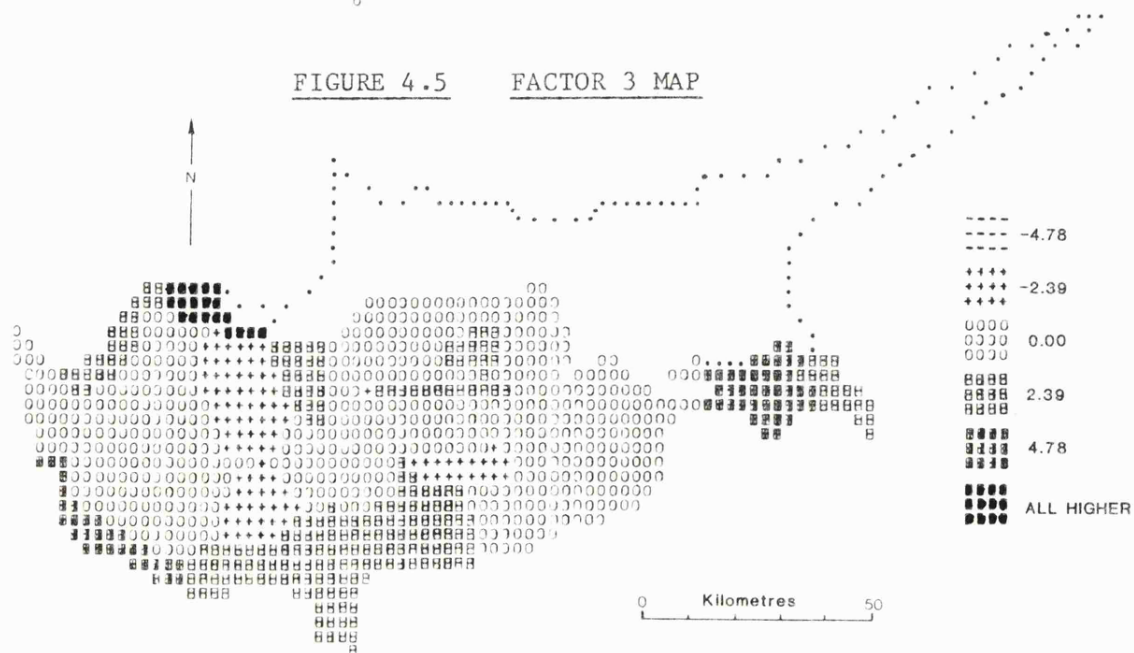


FIGURE 4.5 FACTOR 3 MAP



With the general factor view and allows a spatial interpretation of the factor meaning.

The Factor 1 map (Figure 4.3) identifies a large inland region of considerable structural agricultural problems, whilst lowland and coastal regions score low. The spatial distribution of scores is closely correlated with high relief and follows the 300 metre contour which forms the boundary of the Troodos Massif (see Figure 3.1). This central inland area is divided into two sub-regions: one, to the south-west, of high scores; and the other of slightly lower scores, lying to the north and east.

In the first of these sub-regions the terrain is hilly or semi-mountainous, perennial water supplies are scarce and the predominant land use is vine growing, with the terraced slopes producing some of the best grapes in Cyprus (see Figure 3.2). Where the land is unsuitable for cultivation or is left uncultivated for other reasons, shepherds graze their small flocks. Fragmentation as an isolated phenomenon may not be as bad here as in other mountainous parts of Cyprus, but when it is associated with other variables it makes this area one of severe structural difficulty. Small holding size, high land fragmentation and small plot sizes, combined with a lack of 'extra' land to increase the operated area, results in relatively low farm incomes. In general the vine areas are depressed. There is widespread outmigration of young people to the urban areas of Limassol and Paphos; left behind is a residue of older farmers, over 60 years of age, who continue to use traditional labour intensive methods of cultivating their terraces. Donkeys pulling ancient ploughs between rows of vines are still a common sight.

To the north and south-east of this area lies the second sub-region. This is the mountainous area of Pitsilia, traditionally an area of severe land fragmentation and rural depression. However, the structural problems associated with the vine-growing districts are not as marked here. Outmigration of the young has taken place to a much lesser extent and there

FIGURE 4.6 FACTOR 4 MAP

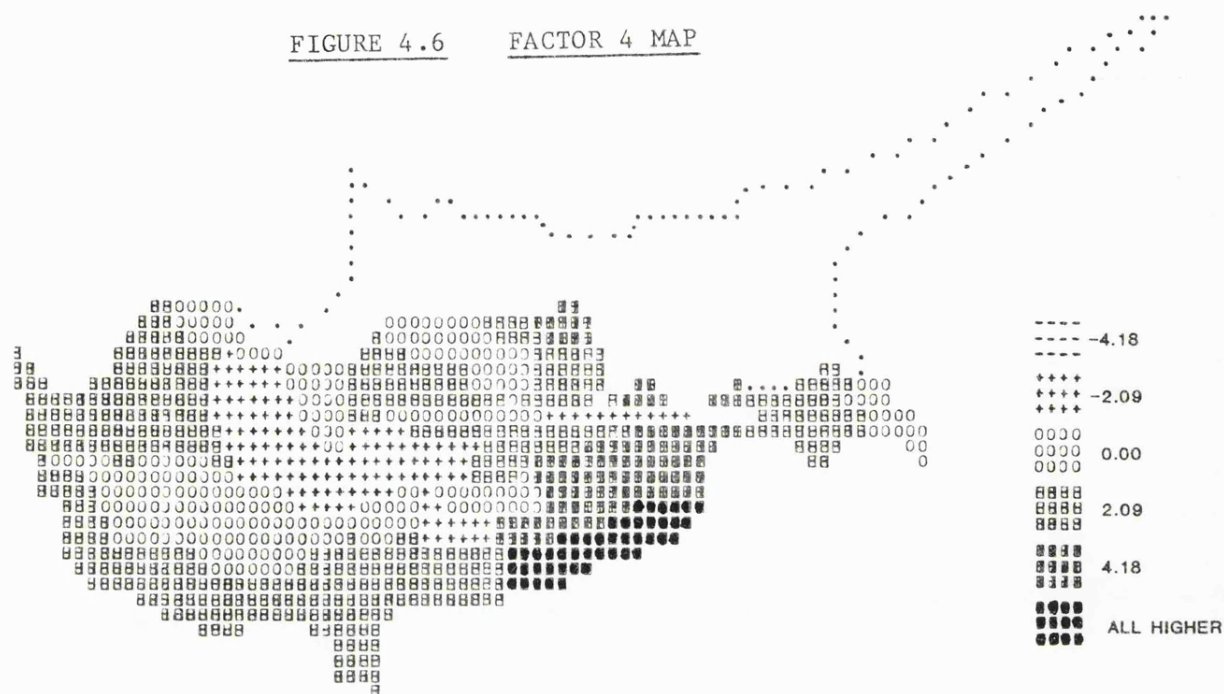
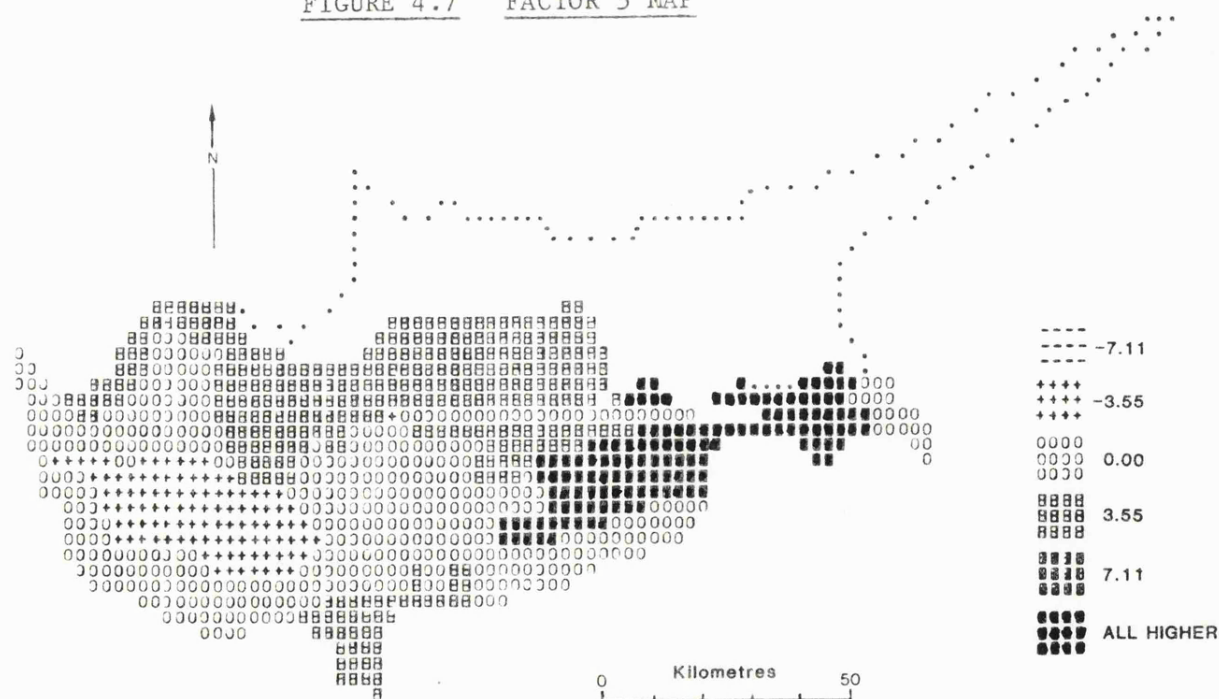


FIGURE 4.7 FACTOR 5 MAP



are some local opportunities to work outside agriculture while at the same time maintaining an interest in the land on a part-time basis.

The map of Factor 2 (Figure 4.4) picks out an area of lowland that exhibits fewer structural problems for agriculture. Much of the area is below 300 metres comprising flat plain or undulating and sometimes hilly coastland. In this area the prevailing agricultural structure allows an adequate income to be derived from farming, although the lack of a reliable water resource often creates problems. This area correlates well with the dryland regions of cereal and carob cultivation (see Figure 3.2). Highest scores are found in the coastal and inland regions of Larnaca district - an extension eastwards of the Mesaoria Plain - where mixed farming predominates. Lowest scores are associated with the central highland region which Factor 1 identified as an area of structural problems.

The Factor 3 map (Figure 4.5) picks out the main areas of settlement in Cyprus. High scores are found close to and around the main towns of Nicosia, Limassol, Larnaca, Paphos and Polis. These high factor scores identify areas of young land holders, often recent migrants from rural villages, who do not have a current interest in agricultural production, being employed in some other full-time occupation. They may characterize a future trend amongst young land holders as urban values and lifestyles assume more importance than a traditional interest in agricultural activity. The absence of such young holders in the highland zone is marked.

By contrast, Figure 4.6, which maps Factor 4, identifies an area of young holders who do continue to maintain an interest in farming, although on a part-time basis. The main area of high scores here is located on the eastern side of the island around the rich and well watered areas of Paralimni and the 'red soil villages' of Kokkinochoria. The returns to agricultural production are extremely high in this area. A further region of high scores extends westwards from Nicosia towards and just into the Troodos range. This may reflect the tremendous mobility of labour in this area as younger workers often live in the village and travel to Nicosia

each day; even if a move is made to the town, an interest in the land is retained which may involve visiting the fields once or more a week (this 'hobby farming' also occurs in the area around Limassol). Low scores in general characterize the inland highland region, especially the vine-growing area and coastal areas to the south, indicating that the young, progressive component of agricultural activity is low in these regions. It would appear that here the part-time farmer is more likely to be a young holder and that the spatial distribution of such owners is a function of both closeness to urban areas and the relative strength of existing structural problems in agriculture.

Finally, the Factor 5 distribution (Figure 4.7) identifies a coastal region where structural problems in agriculture are not severe. But it is in direct contrast to the Factor 1 map (Figure 4.3) with areas below the 300 metre line receiving low scores and areas above high scores. It clearly emphasizes the central inland region as an area of acute structural difficulty.

In conclusion several points are of significance in this analysis. Firstly, all factors are measuring the structural features and problems of Cypriot agriculture. From an analysis of factors, factor loadings and factor maps it would appear that physical, social and economic factors all constitute part of the complexity of the structural problem. This accords well with past work (reviewed in King and Burton, 1981, pp. 9-12): where these factors combine to create structural difficulties, severe problems ensue. In other factors, different combinations of variables may represent differing structural problems. Thus, problems in agricultural structure cannot be defined in isolation since it is a combination of variables that affects the degree of structural difficulty. This has implications for both planning and research, and in this thesis a variety of social and economic variables are considered in the light of an active governmental policy of structural change.

Secondly, the large number of areas identified as having severe

structural problems indicates that research into agricultural structure is of great importance in Cyprus. Its relevance to the future direction and scope of agriculture is evident.

Thirdly, the lowland and coastal regions generally exhibit low structural problems for agriculture although there are differences between the interior dryland cereal-producing areas and the coastal belts in terms of social factors. The contrast between highland and lowland is closely reflected by the distribution of income. Structural problems would appear, therefore, to create and foster inequality. It also needs to be pointed out that many of the Cyprus Land Consolidation Authority's schemes, especially in the first phase, are located in areas where structural problems are less severe (see Figure 3.11).

Finally, the analysis has identified a group of young farmers, with a part-time interest in agriculture, concentrated close to the main urban areas. This spatial pattern may persist into the future as rural-urban migration increases, but it may also be seen to represent a transitional phase, ultimately leading to the complete divorce of urban workers from their village origins.

4.2. THE PILOT STUDY

A pilot study was thought to be necessary for several reasons. Firstly, the suitability of Cyprus as a study area had to be determined. This could only be done by visiting the island and assessing the research potential. Secondly, the development of an effective understanding of the land consolidation process necessitated visits to schemes 'in action'. Finally, an investigation was needed of proposed approaches and methods of data collection. In particular it was necessary to pre-test the questionnaire.

The pilot study involved a six-week visit to Cyprus in May and June 1980. During this period a base was established at the headquarters of the L.C.A. in Nicosia. Information about the island and more specifically about

land consolidation was obtained from a number of sources including libraries at the L.C.A., the Agricultural Research Department, the Water Development Department and the Ministry of Finance. Interviews with key personnel in all these departments were undertaken so that a broad view of the consolidation process could be obtained together with some discussion on viability of the proposed research project. Considerable help and advice were forthcoming and it soon became apparent that Cyprus was indeed a very suitable study area.

An understanding of the land consolidation process was facilitated by a tour of the Land Consolidation Service's various departments and by visits to nine land consolidation schemes in different parts of the island - five under preparation and four completed. During the visits to completed projects discussions were held with Land Consolidation District Officers. A major irrigation works at Paphos was visited and an interview undertaken with the project manager. Here the strong links between land consolidation schemes and irrigation projects were discussed. Cadastral maps recording the situation before and after land consolidation were copied. General maps were obtained from the Lands and Survey Department.

Potential information sources for the evaluation of land consolidation were also explored during the pilot visit. Census statistics were found to be unsuitable since they referred to large areal units which obscured the effects of the much smaller schemes. Moreover, census data are only available for fixed points in time, most recently 1977; this does not permit up-to-date monitoring of changes. Local co-operative societies do contain information on farming inputs and outputs but these data are not easily accessible, being mostly confidential. The generation of primary data in the field using an interview schedule appeared to be the only recourse - and in fact this had always been anticipated since the conception of the project as one of its primary components.

The typing of a draft interview schedule was prepared prior to the visit to the island. It was then modified and enlarged after discussion

with various officials. A random sample of thirty holders from Khlorakas, a consolidated village in Paphos district, were interviewed. The pilot schedule was designed to investigate the suitability of this form of data collection in the Cypriot farming context. It had four specific tasks: to test holders' responses to certain sensitive questions on the family, incomes, debts, attitudes to group farming and to the L.C.A.; to examine sources of information flows about the process of land consolidation; to test at the individual level the significance of variables identified by the factor analysis of census data; and to test the effectiveness of a variety of attitude measures.

Two types of attitude measurement were included in the interview schedule - a Likert scaling technique and a repertory grid. As I described in Chapter 2 (Section 2.4.3.), Likert scales have been developed by psychologists for the measurements of attitudes towards particular ideas. By allowing the respondent to place himself on a scale from one (strongly disagree) to five (strongly agree) problems of introducing interviewer bias are to some extent removed (Dixon and Leach, 1977). More complex scoring methods have been shown to have no advantage (Oppenheim, 1966). At this initial stage no 'item pool' was constructed since the specific aim was to test the responsiveness of the sample to this approach. Holders were asked to evaluate twelve statements about their farming environment. Scores were recorded in a matrix form on the interview schedule. At the end of the interview an 'item pool' was collected in the possible event that this scaling technique would be used in the main study. The item pool was obtained by asking holders, through a series of open-ended questions, about their attitudes to land consolidation and farming activities.

Repertory grids, the second technique, are a more refined attempt at attitude measurement, utilizing the concept of Personal Construct Theory. Again, the background to this was dealt with in Section 2.4.3. This method attempts to establish how individuals view the world in their own terms (these views are the constructs) so reducing researcher bias to

to a minimum. At the pilot stage farmers were asked to respond to specific postulated farm problems. They were asked to relate each problem to their own farm, to a neighbour's farm and to the best and worst farm in the village, in each case along a scale of one to ten. A fixed grid, consisting of a matrix with columns forming the elements (the farms) and rows the constructs (the problems), was used for two reasons: to facilitate the speed of the interview and to allow an evaluation of holders' responses to this form of measurement. Such grids have been used successfully in the past (Floyd, 1977; Harrison, 1973; Townsend, 1977).

Evaluation of the results of the pilot interviews was carried out in Cyprus. It transpired that farmers responded positively to the interview schedule and that this was a satisfactory form of data collection. Problems were not encountered when more sensitive questions were asked and this confirmed the work of other researchers in Cyprus (Loizos, 1975 and personal communication). The variables identified by the factor analysis were found to be significant at the individual level and so were incorporated into the final interview schedule. Significant information flows were also identified. However, it was discovered that holders experienced considerable difficulty in using the repertory grids. As they were relatively happy with Likert scales these formed the basis for the analysis of attitudes to land consolidation in the final interview schedule.

4.3 THE INTERVIEW SCHEDULE DESIGN

The content of the interview schedule, a copy of which is included as Appendix B, is a reflection of specific research hypotheses, the stated aims and objectives of the L.C.A., past empirical work in the field of land consolidation, a factor analysis of the census data and the results of the pilot survey, all of which have been outlined and discussed in earlier sections of this thesis. The schedule was designed as a data collection tool for the evaluation of the process of land consolidation for a representative sample of land holders.

The schedule may be divided into five sections, although these are not actually marked on the interview form itself. The sections comprise: a profile of each individual holder; social economic and behavioural changes in farming after land consolidation; attitudinal data relating to farming in general and to land ownership in particular; sources of information for learning about land consolidation; and the perception of the land consolidation process. These five sections will now be described in more detail.

Section one contained a series of short questions designed to introduce the respondent to the interview schedule. This section was concerned specifically with the holders' main occupation, the location of his place of residence and the amount of time spent farming on an average day. Profile data also included information on the respondent's age, education, geographical mobility and stage-in-the-life-cycle. Such variables were postulated to be important factors in the holder's perception of the consolidation process, his ability to use different information sources, his attitude towards land ownership and farming activities and his ability or willingness to respond positively to the land consolidation scheme. Data on the ages, occupations and residence of holders' children were also collected in order to determine the extent of their existing and potential farming interests. Information on land held by the holder but outside the scope of the particular consolidation scheme was obtained so that an evaluation of the remaining structural difficulties could be made.

Section two examined social, economic and behavioural changes in farming activity as a result of the land consolidation process by using a series of 'before and after' questions. Due to the lack of other data sources this was the best approach in the circumstances. The relative youthfulness of the consolidation schemes under consideration meant that respondents could freely recall information before the implementation of such projects. In some cases, where more sensitive questions were being asked, an alternative response category was introduced allowing a choice between more, less or the same rather than asking for a specified figure.

Specific before/after questions dealt with farmer typology, family farm labour, hired labour, uncultivated area, operated area, land rentals, time wasted travelling to plots, farm incomes, non-farm incomes, farm expenditure, debts, crop types, livestock types and personal possessions. More sensitive measures on farm income required the holder to make an approximation of his farm income for the previous year and then to list his expenses for that same year. Net income figures were then calculated by deducting expenditure from gross income. While holders were generally willing to answer such sensitive questions, in some cases they under-estimated their gross incomes. A check against crop type and area allowed such estimates to be adjusted to more realistic levels.

Section three considered attitudes towards farming activities in general and landownership in particular. 'Before and after' questions were used in an attempt to evaluate changes in attitude towards group farming, the L.C.A., willingness to leave farming, desire for children to farm and the use of agricultural extension services. Information was also obtained on the cost and purchase of farm machinery. It was hypothesized that land consolidation would result in a more modern farming outlook and that this would be reflected by changes in these variables. Questions on group farming were important in the context of future agricultural development and the traditional view of the conservative, individualistic Cypriot peasant; while the response to questions on children farming provided an important indication of the long-term viability of agricultural activity. Attitudes towards future farming activities and land ownership were measured using a point-score technique (Ilbery, 1975; 1977a). Its properties are similar to the Likert scale discussed earlier but with different categories of response as follows: 0 - irrelevant, 1 - not really important, 2 - important, 3 - very important, 4 - essential. The acceptance of Likert scales in the pilot survey indicated that this technique was suitable. But unlike the Likert scale the items to be scored are pre-determined by the researcher's own interests. The disadvantages of such an approach are outweighed by its relative ease of application, the ability for the respondent

to ignore irrelevant items and the chance to use other empirical sources in construction of the factors to be scored.

Attitudes towards farm modernization were assessed by simply measuring the holders' response to increasing personal and financial involvement in agricultural activity. Attitudes to land ownership are more complex and were derived partly from ideas contained in the work of Ruth Gasson, touched on in Chapter 2 (see Section 2.4.2.) and partly from knowledge of the Cypriot situation. Gasson has argued that farmers' motivations can be better understood through a consideration of goals and values. In her words, 'values may refer to instrumental, social, expressive or intrinsic aspects of farming, and it is their ordering relative to one another which influences farmers' decisions in situations of choice' (Gasson, 1973). Her empirical work suggested that farmers have a predominantly intrinsic orientation to work, valuing the way of life, independence and preferences of farm work above expressive, instrumental or social aspects of their occupation. These ideas were incorporated in the selection of a number of variables postulated to influence the decision to own or hold land (Table 4.4). A point score technique was employed to measure the relevance and relative importance of each factor to the holder concerned. No previous investigation of this kind has been carried out in Cyprus. It was postulated that attitudes to land ownership would be reflected in behavioural and attitudinal changes after the land consolidation process and that such attitudes, a result of fixed goals and values, may to some extent be determined by variables outlined in the first section of the interview schedule.

Section four of the schedule examined the role of information flows during the decision-making process to adopt land consolidation measures. Information theory suggests that different information sources are used at different stages of the adoption process, rather than specific sources being used at all stages. Empirical work in Ireland, such as that carried out by Bohlen and Breathnach (1970), has identified five such stages: an awareness stage when an individual learns of the existence of an idea or practice;

TABLE 4.4LAND OWNERSHIP VARIABLES USED IN THE POINT SCORE ANALYSIS

Land ownership variables:		Classification
1	Making as much money as you can	Instrumental
2	Making a satisfactory income	
3	As an investment for the future	
4	Enjoyment of farm work	Intrinsic
5	Chance to do work without supervision	
6	Feelings of pride of ownership	Expressive
7	Feelings of contentment	
8	Following the family tradition	Social
9	Recognition and prestige	
10	Dowry for children	

Key to classification:

Instrumental: Land ownership is valued as a means of obtaining an income from farm work or other sources.

Intrinsic: Land ownership is viewed as providing the means of pursuing an agricultural activity in its own right.

Expressive: Land ownership is seen as a means of self-expression or personal fulfilment.

Social: Land ownership is viewed as a means of providing and maintaining social and family linkages.

Source: After Gasson (1973).

an information stage when an individual seeks further basic information regarding it; an evaluation stage when an individual takes the knowledge he has about the idea and weighs the alternatives in terms of his own use; a trial stage, on a small scale, used by the individual to assess its suitability; and an adoption stage when an individual uses an idea or practice on a full scale. In the context of this research the last two stages are not applicable. The evaluation stage is followed by a vote, either for or against land consolidation and once a favourable majority is attained, the L.C.A. proceeds with the implementation. Adoption and diffusion research has also shown that information sources are used to a very limited extent at these later stages.

In the interview schedule holders were asked three questions: (i) where or from whom did they first hear about land consolidation generally; (ii) after they had heard generally about land consolidation, who or what helped them make up their minds that they liked or disliked the idea; and (iii) after they had decided that they liked the land consolidation idea, who or what helped them to decide that it would be a good thing for their own farm. Holders' replies were constrained by twelve possible responses including mass-media sources, specific enlightenment sources of the L.C.A., intra and inter-family discussions, school or college courses and learning through travelling or visiting. Access to and use of information sources are postulated to be significant in attitudes to and perception of the land consolidation process and are also hypothesized to be related directly to personal variables in Section one of the schedule. The relative role of information sources can be assessed; particularly the L.C.A.'s enlightenment measures.

The fifth and final section of the interview schedule attempted to measure the holder's perception of 'image' of the land consolidation process. A Likert scale was employed to measure attitudes to specific items. These items were drawn from a larger item pool collected during the pilot survey. Holders were asked how strongly they agreed or disagreed with a series of

statements. Their responses were recorded on a scale of one (strongly disagree) to five (strongly agree). Negative statements followed positive ones so that a holder could not simply indicate the same response category. The statements reflected five main features of a consolidation scheme: (i) the concentration of plots and changes in farming activity, crop specialization, production costs and production levels; (ii) the new road network and plot and market accessibility; (iii) the new plot shape (i.e. greater rectangularity) and more effective use of land and machinery; (iv) the new plot size and changes in land productivity and crop types; (v) irrigation provision, water access and changing cropping patterns. The perceived image of the consolidation process is related, to some extent, to the utilization of information flows itemized in Section four of the schedule and to other variables recorded in the previous sections. This image also conditions the behavioural, attitudinal, social and economic changes measured in Sections two and three.

A series of checks, designed to test the consistency and honesty of response of each holder was deliberately introduced into the interview schedule. On the basis of the information derived from the checking procedure, a decision was taken as to whether to include or exclude that particular schedule, or whether to modify specific responses in the light of answers to other questions. Cross checks were possible by comparing answers to the following questions: farmer typology and number of hours spent farming; age of respondent and number of years resident in one village; area cultivated and the total cropped area; land rented in or out and the total operated area; income from farming and cropped area and crop types; machinery and personal possessions; expenditure on farming and costs per donum and farm machinery purchase; non-farm income and part-time or full-time occupations; modernity of outlook and use of extension services, purchase of farm machinery, attitude to retirement and group farming; attitude to land ownership and farmer typology; incomes and stage-in-the-life-cycle; use of information sources and geographic mobility, personal possessions, age, education and visits by the L.C.A.; perception of the land consolidation

process and farmer typology, hours spent farming, crop changes, water consumption and production costs per donum. At the same time some of the answers given could be checked by reference to the L.C.A. records or to L.C.A. officials.

4.4 SAMPLING PROCEDURE

In this section the decisions involved in the selection of the sample villages are outlined and the sampling procedure for each of the chosen projects is discussed.

4.4.1 The Choice of Sample Villages

Two criteria restricted the choice of sample villages. The first was a requirement that the land consolidation scheme in the village must have been completed at least four years ago. This was considered a sufficient time period for any effects of the consolidation process to have become noticeable. The second was a desire to consider villages from different physical, social and agro-economic locations so that a broad and yet differentiated understanding of the effects of land consolidation on prevailing structural problems could be acquired. After all, the results of the factor analysis of census data had suggested considerable spatial variations in structural difficulty.

These two considerations confined the number of village schemes that could be studied to five. All belonged to first-phase projects and included the villages of Kissonerga and Khlorakas (lowland coastal), Akrounda and Phinikaria (highland coastal) and Palechori (mountainous inland). The locations of these villages are on Figure 3.11.

4.4.2 The Choice of Sample Interviewees

A sample of holders from each of the selected villages was needed. In order to achieve a sample that was representative of the whole land-holding population affected by land consolidation a somewhat lengthy procedure was followed. Firstly, reference was made to lists of holders

prepared after the completion of the land consolidation schemes (this study was not concerned with holders who had been excluded as a result of land consolidation). Continuity of ownership before and after land consolidation was the important factor here. Using information on sales and donations of land provided by the Lands and Surveys Department, these lists were updated so that holders who no longer owned the same area of land after the completion of schemes could also be excluded. In this way information on the refragmentation of consolidated land was obtained. A final list of eligible owners was prepared for each of the sample villages.

The land consolidation process affected holders owning various amounts of land. Since holding size could have an effect on the evaluation study it was necessary to stratify the list of eligible owners by holding size. Four holding size groups were identified (five in the case of one project) and a list of eligible holders falling into each group prepared. A random sample of 50 holders was carried out proportionately for each size-group (See Table 4.5). Although a sample of 50 holders for each scheme was rather larger than the 10% cited as sufficient by many statistical texts (e.g. Gregory, 1963; Hammond and McCullagh, 1978) this was considered necessary because of the uniqueness of the individual land consolidation experience. In the case of Akrounda and Phinikaria villages, the lists of eligible owners was combined, partly because of the smallness of the schemes and partly because both schemes came from similar physical environments. Finally, the selected random stratified sample was subject to further modifications after initial visits to village areas and discussion with local officials and land consolidation officers familiar with the areas. Holders were excluded who were too old, too difficult to locate or known to be unwilling to participate.

A total sample of 200 holders from the five consolidated villages was thus drawn up. For the Palechori sample visits were made to the village and the land consolidation area from Nicosia two or three times a week. Considerable problems of locating the identified sample were encountered

TABLE 4.5

SAMPLING PROCEDURE FOR INTERVIEWEES

Village	Holding Size Group (donums)	Total no. of Eligible Holders	Eligible as % of Total Holders	No. of Holders Sampled
Palechori	1 - 2	23	16.5	7
	2 - 5	67	48.2	23
	5 - 10	36	25.9	16
	10 - 20	10	7.2	3
	Over 20	3	2.2	1
	Total	139	100.0	50
Kissonerga	2 - 5	77	45.8	23
	5 - 10	51	30.3	15
	10 - 20	33	19.6	10
	Over 20	7	4.1	2
	Total	168	100.0	50
Khlorakas	2 - 5	78	50.3	15
	5 - 10	55	35.5	23
	10 - 20	12	7.7	9
	Over 20	10	6.4	3
	Total	155	100.0	50
Akrounda and Phinikaria	2 - 5	70	63.6	34
	5 - 10	28	25.4	13
	10 - 20	8	7.3	2
	Over 20	4	3.6	1
	Total	110	100.0	50

here and the total interviewing period for this village was ten weeks. Where holders were unwilling to participate or could not be located after several attempts the next holder on the list was considered. This procedure was also employed for the other villages. Interviewing at Kissonerga and Khlorakas necessitated a move to Paphos town. In these villages the samples were much easier to locate; interviewing for both villages combined took six weeks. Akrounda and Phinikaria were visited from a base in Limassol. Here again the sample was relatively easy to locate and a total of five weeks was spent interviewing in these two villages. Interview times in all project areas varied considerably in length. Often an exchange of courtesies and a preamble explaining the purpose of the visit were necessary. Most interviews took around one hour although some lasted two or three hours. Interviews were carried out in a variety of places including farmers' plots, farmsteads and houses, and in offices and coffee-shops. The last-named, however, were generally avoided because of the danger of the interview becoming a source of general interest, thereby introducing considerable bias into the responses of the holder.

Interviews, conducted in Greek, were carried out jointly by the author and a helper from the L.C.A. always working together. Prior to the interview period a thorough discussion with this officer took place so that the method of questioning could be established. I recognise that some element of bias may have been introduced into the methodology and results because of the use of the officer. However, in the context of the types of questions asked in the interview schedule, this element is probably small. Only one question requests a critical appraisal of the L.C.A. Moreover, the assistance of the officer had many advantages including a background knowledge of the area, an ability to locate the sample and the overcoming, to some extent, of holders' natural suspicion and reluctance to answer questions from a complete stranger. Finally, the triangular combination of researcher, interviewer and holder created a unique situation in which the holder, out of politeness to a stranger, would first start answering questions and then, out of respect to the officer, would continue answering questions

even if the interview was obviously taking longer than he expected.

4.5. INTRODUCTION TO THE SAMPLE VILLAGES

This section provides the background introduction to the five sample villages and places the consolidation projects within a wider village and regional setting. The location of these sample villages can be found by referring back to Figure 3.11 and the position of the projects within the villages' boundaries can be seen in the map in Appendix D.

4.5.1. Palechori

Palechori is a village of the Eastern Troodos range and lies on the Nicosia-Agros road four kilometres north-east of Papoutsa Peak. The village dates from Byzantine times but it is by no means certain that the name means 'Paleo chor' (old village). Inhabitants tell the story of a big storm in the past which forced everyone to seek refuge in the church; the late-comers were greeted with the now-defunct expression 'pale hori' (come on in; there's still room) (Goodwin & Symonds, 1980, p. 62). During the Middle Ages Palechori was part of the Commandary of Templos and as such achieved considerable importance. Many of the surnames of the village inhabitants have Latin roots, implying an influx of people at that time, and the houses have an Italian mountain village look. The village is compact, with houses closely built together due to lack of space and narrow winding streets. Lying at a height of nearly 1000 metres the village has a picturesque canyon setting with much vegetation in the lower areas.

The village and surrounding settlements form the region of 'Pitsilia' whose inhabitants are called 'Pitsilloi'. This common name is a recognition of the distinctive characteristics which are said to single out the inhabitants of the area (Peristiany, 1965, pp. 171-172). Some Cypriots point to them as the living embodiment of traditional values of manliness, perseverance, hardiness and generosity. At the same time the name was, and to a considerable extent still is, associated with squalor and backwardness, an accusation which should be attributed to the inaccessibility and harsh

living conditions of the area. It is this inaccessibility and un-worldliness of the region, however, which has caused it to gradually develop into a bastion of Greco-Christian culture, with Greeks seeking refuge there during periods of Turkish domination. Some of the best frescoes and churches in Cyprus are to be found in this region. Thus the Pitsilloi take pride in the belief that they are the purest Greek Cypriots racially, culturally and linguistically.

Palechori is one of the largest settlements in the Pitsilia region. Officially designated as a rural service centre, it has important central place functions. The population grew quickly in the 17th Century with the arrival of people from six other villages. The first school was established in 1850 with about 40 students. 'Pano' and 'Kato' are used locally to distinguish the two sections of the village that were once separated but now run together. The village had a population of 1,771 in 1946 and 1,906 in 1960, but by 1973 this had fallen to 1,683. Palechori was the only settlement in Pitsilia with more than 1,000 inhabitants to record a decline during this period. Outmigration from the region is, however, common, especially from the smaller settlements. When a direct move cannot be made villagers commute to Nicosia 40 kilometres away.

In common with the other villages of Pitsilia, Palechori is characterized by a high local employment in agriculture. However, land values and agricultural incomes are low reflecting the difficult terrain and land tenure problems. The total village area is 26,534 donums, but of this only 20% is suitable for agriculture. Private ownership predominates and the rented area is very small. Fragmentation, although extensive, is not as severe as in the surrounding villages. Holdings with more than nine plots covered 63.7% of the total agricultural area in 1977 and in 1946 there was an average of 19 plots per holder. Only a small part (43.2%) of this area is cultivated and most of the land is unirrigated. Major crops are cereals and fodder while in irrigated areas vegetables, especially spring and winter potatoes, are the chief crop. Livestock production is an important

element of village agriculture and goats dominate with roughly ten goats per donum of land. Typical products from such enterprises are 'halloumi' cheese and yogurt sold locally and in the main towns. Mechanization is low, a reflection of the difficult topography, land fragmentation and low incomes.

The Palechori consolidation scheme occupies only a fraction of the total village area and about 20% of the total agricultural area (Appendix D). The irrigated agricultural land is located within the project area. The scheme lies 11 kilometres east of the main settlement and 30 kilometres west of Nicosia. The main Nicosia-Agros road, following the winding Serakhis river valley, runs the length of the consolidation area. The project has a strange shape: an elongated triangle with its base in the north and apex in the south. Water is provided from the Palechori dam, built on the Kambi tributary of the Serakhis river. Completed in 1973 at a cost of £ CY 330,000 it lies 1.6 kilometres to the northwest of the project area. The distribution system is by concrete channel constructed at an earlier period and this forms the eastern boundary of the scheme. Water is diverted using sluice gates and reaches the fields under gravity through earth channels or plastic pipes.

4.5.2. Kissonerga and Khlorakas

Kissonerga and Khlorakas, separated by the small village of Lemba, are situated on the west coast of Cyprus. Kissonerga lies six kilometres north of Paphos town, while Khlorakas is only three kilometres from Paphos. At an elevation of 65 metres the villages are part of the Paphos lowland which stretches from Peyia to Yeroskipou. Both settlements are separated from the sea by a coastal plain that varies in width from 800 metres to 2.4 km. The plain is widest at Khlorakas and narrows northwards. The surface of the plain is level or gently sloping and has a covering of alluvium carried by the rivers from the hills above (see Appendix D map).

Khlorakas was first recorded on a map in 1630 but it is obviously much older, possibly Neolithic for numerous ancient sites exist hereabouts.

The name's origin, though obscure, is appropriate for 'Khloro' means 'green, fresh'. This large village has become a prominent market gardening centre, thanks partially to imported soil brought in to cover some of the more rocky terrain. Flowers are also grown and thrive in the area, with many beautiful front gardens on display. Khlorakas' population was under 100 a century ago, but by 1946 it had risen to 877, and by 1960 was 1,117.

Nicknamed the 'tomato and cucumber' village, Khlorakas gained international fame as the landing site for General George Grivas in November 1954 when he returned clandestinely from Greece to lead EOKA against the British. The caique St. George, in which he travelled, was captured and destroyed by the British and its wrecked remains can still be seen.

A rather smaller settlement, Kissonerga dates from the Middle Ages although a substantial number of ancient sites have also been discovered. Its early name from this period was 'Khryso-Nera' (golden waters) probably inspired by the clear water and fine bays of the coastline. Unlike Khlorakas the village population has remained relatively stable and grew only slightly from 677 in 1946 to 698 in 1960. Kissonerga is well-known amongst Cypriots for its production of bananas which cover the slopes around the village and appear regularly in Nicosia markets.

The Paphos coastal region is predominantly agricultural. The terrain, market accessibility and prevailing land tenure structure facilitate agricultural production. Consequently land values and agricultural incomes are high. In Kissonerga more than 50% of the entire village area (6,686 donums) is agricultural land while in Khlorakas the figure is 68%. Land tenure problems are not as severe as in other areas of Cyprus. Irrational land fragmentation is not widespread - the 1946 Census of Agriculture puts the average number of plots per holder at twelve in both villages. Consequently holding and plot sizes are large making possible the use of modern farm machinery (average plot sizes were 2.8 donums per holder in 1946). Generally the region is characterized by stability and prosperity with population growth in some villages. The standard of living is high

and is reflected in the settlement structure which is composed mostly of large modern houses with fine gardens scattered in a linear fashion along the main roads. Tourism is gradually making an appearance with hotels spreading eastwards from Paphos town. In Kissonerga Coral Bay is a popular resort and a number of vacation and retirement homes have been built in the last 15 years.

Both the Kissonerga and Khlorakas consolidation schemes occupy significant proportions of the respective villages' agricultural areas. In Khlorakas the project area accounts for 63% of agricultural land while in Kissonerga more than 50% of the agricultural area has been affected. In Kissonerga the consolidation area is divided into two parts, separated by a government owned chiflik (the remains of an ancient feudal estate). Both schemes are concentrated on the coastal plain and are bounded on the west by the sea and on the east by coastal hills. Water is provided by the Mavrokolymbos dam, completed in 1966 at a cost of £ CY 335,000. This was purpose-built to supply water for early summer crops for the villages of Paphos coastal region. Prior to this, water came from shallow wells but these yielded an inadequate supply. The project to dam the Mavrokolymbos river formed part of an overall plan for the development of the whole region including the building of more dams and groundwater extraction (Konteatis, 1974). The dam, 40 metres high, is the largest in Cyprus. The distribution system consists of a main enclosed underground conveyor with a series of smaller on-farm pipelines. Water travels under gravity and is regulated through a series of water meters on each holding.

4.5.3. Akrounda and Phinikaria

The villages of Akrounda and Phinikaria lie close to each other on the coastal highlands of Limassol. Akrounda, at an altitude of 100 metres, is approximately 28 kilometres north-east of Limassol. Nearby Phinikaria, at an altitude of 180 metres, is just over 30 kilometres from Limassol. The terrain in both areas is hilly, interspersed with some fertile valleys. Again, the fold-out map in Appendix D sets these consolidation schemes in their respective village settings.

In contrast to the other sample villages both settlements are of a relatively recent origin. Akrounda derives its name from the Greek word 'akra' or 'cliff', having developed as a settlement at what was once the edge of a cliff face. Phinikaria was named after the palm trees which used to grow in the village, although few are evident today (Goodwin, 1976).

Both villages are small. In 1865 the population of Akrounda was under 200; by 1946 it had reached 259 persons. Since then it has remained stable and was estimated in 1973 at 250 persons. Contrastingly Phinikaria has undergone a rapid depopulation. In 1946 the village population was 226, by 1960 this had decreased to 200 and in 1973 it was estimated at 140 persons. Outmigration, a characteristic of a large number of small rural settlements in Cyprus, has been to nearby Limassol.

The villages are a part of the Limassol mixed farming region which lies inland, encircling the highlands to the north-east of Limassol town. Generally the settlements in this area are impoverished and have undergone considerable decline in recent years. Much evidence comes from the village structure. Crumbling walls in both Akrounda and Phinikaria combined with the low utilization of nearby agricultural land point to a reduction in prosperity.

Agriculture, once a traditional way of life, is diminishing in importance. Lack of adequate water, poor soils and the availability of full-time non-agricultural employment in nearby Limassol have reduced interest in the land. Problems of land tenure, particularly fragmentation, are worse than on the coastal lowlands with the 1946 Census of Agriculture recording 16 plots per holder in Phinikaria and 14 plots in Akrounda. The combined area of both settlements is just over 9000 donums with only 25% of this used for agricultural purposes in Akrounda and 15% in Phinikaria. The irrigated area is small, about 10% of the agricultural land. The main crops are carobs, olives and almonds with some citrus and vegetables in irrigated areas grown for the expanding tourist area around Limassol. Livestock is important with goats dominating and there are also

some sheep. Main products are 'halloumi' and 'fetta' cheeses.

The consolidation projects affect only small parts of the total village areas. In Phinikaria the scheme has been divided into three separate units accounting for only 1.2% of the total village area. In Akrounda the compact consolidation scheme is slightly larger but still only affects 1.6% of the village area. Both schemes are close to their village centres and are irrigated with water from the Yermassoyia dam, constructed in 1968 at a cost of £ CY 930,000. Water is pumped onto the high ground above the project areas and fed by a series of pipes and earth channels to the plots below.

4.6. NOTES ON THE ORGANIZATION OF THE FIELDWORK

The main period of fieldwork was undertaken from October 1980 to August 1981. The ten-month period can be broken down as follows: from October to December time was spent in Nicosia organising and setting up the fieldwork; from January to March interviewing and land-use mapping took place at Palechori village; April to June involved interviewing and land-use mapping in Kissonerga and Khlorakas villages; finally, from June to July interviews and land-use mapping were carried out at Akrounda and Phinikaria villages.

Time spent working in Nicosia made up a significant part of the work programme. The main office of the L.C.A. was located here and the use of a desk and library facilities were provided on my arrival. These first few months were critical in establishing the basis for the successful working of the project. During this time sampling frames for the interviewing stage were constructed for each of the sample villages. Cadastral maps were obtained (several copies were needed) and a method of land-use recording determined, partly on the basis of previous surveys carried out by the L.C.A. In order to facilitate comparison with these it was necessary to 'time' visits to the sample villages so that these coincided with the L.C.A.'s periods of mapping. This avoided problems of the seasonal change

of crop types. However, obtaining the mapping dates was not a simple exercise since no official records existed. It took some weeks of enquiry at various local offices to eventually get these. On the basis of this information the order of priority of the land-use surveys and also the interviewing were determined. Palechori, with the L.C.A. land-use maps completed in April, became the village in which fieldwork was first started. With the help of a member of the L.C.A. the interview schedule was translated and typed; 200 copies were run off using the L.C.A.'s reprographic service.

As the first sample village for fieldwork Palechori posed all sorts of problems. Its location at 40 kilometres from Nicosia meant that visits were limited because of costs; no base to live could be found in Palechori village itself. The problem of access and distance was compounded by the fact that the consolidation scheme was at some distance from the village. Also, some holders of land in Palechori lived in Nicosia or commuted between residences in the village and the capital. The timing of visits therefore became crucial if holders were to be located. On most occasions the holder's fields had to be visited first, before continuing on to the village. Prior to the interviewing a preliminary visit was made to the village and after discussions with local representatives the sampling frame was amended. Information was also collected about the timing of visits so that a rough idea of when and where a farmer would be at certain times of the day could be determined. This visit also 'prepared' the villagers for the more frequent appearances of the author in the weeks to come. Despite these preliminary visits and groundwork, it still proved difficult to locate the sample. Poor weather further hindered progress. It took a discouragingly long time to complete the 50 interviews! Nevertheless the response rate was good and holders showed a keen interest in the questions asked. Only two refusals were made; in each case the next holder on the list was selected and successfully interviewed.

The final fieldwork stage in Palechori involved a land-use survey.

This also proved rather more difficult than had originally been anticipated. Problems occurred over the matching of plot boundaries marked on the map with those actually in the area. This was partly the result of the irregular topography and partly because there were no hedges, walls or fences delimiting fields. However, when mapping eventually began the process was speeded up by the use of a 'trail' motorcycle which was able to cope with the rocky terrain and aided movement between plots. The land-use survey took three weeks. Information was recorded directly onto a cadastral map using a number coding system. A small notebook was also kept for additional data, particularly the type and size of buildings in the area.

In April arrangements were made with the local Land Consolidation Service for a transfer of fieldwork to Paphos. It was anticipated that this phase of fieldwork would be completed much more quickly since the two villages in this area, Kissonerga and Khlorakas, were readily accessible and nearly all holders actually lived there. Accommodation was found close to the Paphos district office of the Land Consolidation Service. District staff rendered invaluable help in locating interviewees and in facilitating visits to various schemes under preparation and underway. Detailed knowledge was gained about the valuation and surveying stages of consolidation.

Interviews were first conducted in Khlorakas village. The sampling frame needed little modification and it was fairly easy to locate holders. Interviews took place in owners' homes and also in the fields. In most cases the coffee-shops were avoided, although on some occasions they were used during slack periods. Most farmers were extremely responsive and interviewing proceeded faster than at Palechori, with interview times averaging around one hour. There was only one refusal. Interviewing in Kissonerga was delayed for three weeks after a motorcycle accident in Paphos town which required hospital treatment in Nicosia. On returning to Paphos work had to be reorganised and interviews started in Kissonerga. Here the average interview time was 50 minutes. Allowing for the three week gap, interviewing in the two villages was completed in six weeks. This compared

favourably with the time spent in Palechori.

The land-use survey for Khlorakas and Kissonerga was also much easier, aided by the level terrain and easily identifiable plot boundaries. The repaired motorcycle again proved invaluable at this stage. Records were made of any building or touristic development. It took two weeks to complete land-use mapping for these two villages.

The end of June saw a brief return to Nicosia to collect more interview schedules and organise the fieldwork in Akrounda and Phinikaria.

Accommodation was found in Limassol close to the road leading out of the town to the sample villages. Although, for the purposes of sampling, both villages had been combined, it was expected that interviewing would still be troublesome because of their small size. This proved true, particularly in the case of Phinikaria where many holders had moved to Limassol. Visits therefore had to be made to homes in the main town as well as in the village. Interviews took an average of one hour 15 minutes. The land-use survey was quickly completed because of the small areas involved. Both stages of the fieldwork took four weeks to complete. At the end of this period a return to Nicosia allowed final arrangements to be made for the transportation of all material home.

4.7. TYPES OF ANALYSIS CARRIED OUT

Data for analysis were obtained from two sources: land-use maps provided by the L.C.A. and created by the author's land-use surveys; and the author's questionnaire survey. Investigation of this information has involved both cartographic and statistical techniques. A wide range of computing facilities have been used to assist in the data processing and presentation stages. These include the University of Leicester's mainframe Cyber and departmental PET and APPLE micro-computers.

4.7.1. Cartographic Analyses

Information contained in the land-use and cadastral plans was

processed in several ways. Land-use maps provided by the L.C.A. had to be translated, re-coded, classified and finally re-drawn, so that the maps were compatible between survey years and between villages. When this had been done the total area under each land-use was calculated. This was done by using the graphics tablet of an APPLE micro-computer, digitising land-use zones directly from the prepared maps. A simple program - DIGIT 9 - written by Mr. David Unwin of the Department of Geography, University of Leicester, allowed the easy calculation of area data from these digitised zones. Non-continuous zones under the same land-use types were then summed to give a total picture for each village scheme. A similar methodology was employed for calculating the area under land-use types in distance zones from the main settlement. The results of these analyses are presented in the next chapter.

Operationalization of the holding structure index (H_s) described in Chapter 2 required the calculation of shape indices and mean distances. Measurement of plot shapes for individual holders necessitated the tracing off of fields from the cadastral plans. Using a compass a circle, totally inscribing the plot boundary, was drawn round each field. Using the computer program mentioned above the plot and circle areas were easily calculated and the shape index formula applied. Mean distances between plots for each holding were recorded directly from the map and involved the compilation of a simple matrix of measurements between plots (because the position of the holder's residence was often unknown) and the summing and averaging of vertices. The holding structure index computer program was then run on the departmental PET micro-computer for each of the holders in the total sample ($n = 200$) and the results added to the data files described below. Again, the results of these cartographic and cadastral analyses are given in Chapter 5.

4.7.2. Interview Data Analysis

Data collected via the interview schedules for the total sample of holders ($n = 200$) were post-coded using Fortran coding forms and placed in

a data file stored in the mainframe Cyber 73 at Leicester University. From this primary data file a series of smaller files for each of the sample villages was constructed and stored in a similar fashion. Analysis of the information in these files involved the use of the well-known 'Statistical Package for the Social Sciences', or S.P.S.S. (version 8.0, June 1979), implemented at the University of Leicester in April 1980, with updates in January and June 1981. Several package options were intensively employed and these are described briefly below (for more detail refer to the S.P.S.S. Manual, 1976).

SUBPROGRAM FREQUENCIES: produces one-way frequency distributions with descriptive statistics. This allowed the early investigation of data files and the correction of any errors in their original compilation. Tables and histograms were printed for selected variables described in Chapter 2.

SUBPROGRAM CROSSTABS: allowed the compilation of two-way to n-way joint frequency distribution tables. This was used to investigate the results of the point-score and Likert attitude scaling techniques. In the case of Likert scales, calculations of total scores for each statement were made and the statements ranked in order of importance. This procedure enabled me to determine the significance of the measurement technique and although not printed in this thesis provided the basis for the Factor Analysis described below. Where point scores were used (i.e. attitudes to land ownership and farm modernization and improvement) a total score for each factor was also calculated. These factors were then ranked in order of magnitude and three indices, following Van der Vliet (1972) and Ilbery (1975; 1977b), were calculated:

- (i) Percentage Applicability (%A) - the number of cases where the factor applied, expressed as a percentage of the total number of cases investigated;
- (ii) Total Percentage (%T) - the total score, expressed as a percentage of the maximum possible score for all cases investigated;

- (iii) Percentage Importance (%I) - the total score, expressed as a percentage of the maximum possible score for those cases where the factor was applicable.

SUBPROGRAM FACTOR: this varies little from the factor analysis used in the investigation of Cypriot agricultural structure described by Section 4.1 of this chapter. One notable difference is that the S.P.S.S. program (PA2) replaces the main diagonal elements of the correlation matrix with communality estimates and is known as the 'principle factoring solution', following Harman (1967). For a more detailed discussion of these differences see Johnston (1978, pp. 161 - 162). The program also determines the number of factors to be extracted from the original correlation matrix - only those factors with eigenvalues greater than one - and is based on Kaiser's method outlined earlier. As noted previously, this method does have deficiencies particularly when the total sample ($n = 200$) is being examined. Factors were rotated using the Varimax method and factor interpretation carried out in the same way as in Sections 4.1.2. and 4.1.3. above. The program was used in the analysis of Likert and point score attitude scales. While there exists some controversy over the suitability of such data, the use of factoring techniques can be empirically justified (Anastasi, 1976; Dawes, 1972; Gasson, 1973; Oppenheim, 1966).

SUBPROGRAM REGRESSION: this statistical technique enables the analysis of the relationship between a dependent variable and a set of independent variables. In this analysis multiple regression is used as a descriptive tool by which the linear dependence of one variable on others is summarised and decomposed. A stepwise multiple regression is used, independent variables being entered one by one on the basis of pre-established criteria. The forwards (stepwise) inclusion method enters independent variables by their respective contribution to explained variance. Collinearity, a problem of bivariate regression discussed in detail by Johnston (1978, pp. 74 - 77), was avoided by consideration of the zero-order correlation coefficients and the rejection of one of a pair of highly inter-correlated data

sets. Where data did not fit the assumptions of the regression model, particularly those of linearity and homoscedascity, variables were logarithmically transformed. A thorough description of multiple regression is given by Johnston (1978, Ch. 3). Regression was used in this study to examine the inter-relationships of some of the variables specified in Chapters 2 and 3.

SUBPROGRAM NON-PARAMETRIC TESTS; the available techniques include a wide range of one-sample, related sample, independent sample and reliability tests. Options used included the K-sample Median Test and the Kolmogorov-Smirnov Two-Sample Test. These were used to examine relationships between attitude data and other variables which rarely conformed to normal distributions or other test specifications (i.e. cell frequencies for chi-square). The K-sample Median Test is an extension of the Median Test and examines differences in central tendency testing whether two groups have been drawn from populations with the same median. The Kolmogorov-Smirnov Two-Sample Test examines the goodness of fit of distributions. Where the Median Test is most sensitive to differences in the median, this test is sensitive to any type of difference in the two distributions - median, dispersion, skewness, etc. The one-tailed test can be used to determine whether the values of one group are generally larger than the values of another group. This technique has been described in detail by Siegel (1966, pp. 127 - 136) and has been used extensively by Ilbery (1975) in his analysis of farmers' perceptions in north-east Oxfordshire. However, after some experimental use of the S.P.S.S. test it was discovered that this version had not been fully initialized at Leicester and so most of the computations were carried out by hand.

CHAPTER FIVE

CHANGES IN THE AGRARIAN LANDSCAPE

In this chapter we return to the visible and structural features of the agrarian landscape and examine the more tangible aspects of the process of land consolidation in Cyprus. This chapter is an account of the effects of land consolidation on the Cypriot rural landscape, especially as regards holding structure and land use patterns. It illustrates, among other things, the changing nature of the bond between the land and the user of the land and pays particular attention to the way these changes vary spatially as between the different environments of the five First Phase consolidation projects.

Data for this chapter are drawn from published and unpublished documents of the L.C.A. and from the author's questionnaire to the 200 sampled holders in Phase One schemes. The main part of the questionnaire analysis, however, concerning economic and behavioural aspects of the consolidation process, is contained in Chapter 6.

5.1. CHANGES IN HOLDING STRUCTURE

Changes in holding structure, though not easily visualised in the Cypriot agrarian landscape, are a major feature of the process of land consolidation. In this section data broken down by holding size groups

are first considered for all primary phase projects. Also included are the results of an evaluative investigation into the holding structure of the total sample of holders. Next, changes at the village level are presented, using cadastral plans and tables. Finally, changes in farm structure for the sample of holders from each village scheme are described.

5.1.1. Structural Change in Phase One Projects

One of the most important effects of the consolidation process has been the reduction in the level of fragmentation (see Table 5.1). Before consolidation the average number of plots per holding for all First Phase schemes was 2.23. After consolidation this had fallen to 1.36 plots. This level of reduction may not appear very dramatic but fragmentation levels in some of the larger holding size-groups were much higher before consolidation (as Table 5.1 shows). The 10 - 20 donum group had an average of 5.05 plots per holding before consolidation and the 50 donum plus group had a mean of 16. After consolidation these figures have been reduced considerably with averages around two plots per holding. Increases in holding size from 4.35 donums before to 6.64 donums after consolidation, combined with reduced fragmentation, have led to rapid increases in plot sizes. These have risen from 1.94 donums to 4.75 donums.

Another striking feature of Table 5.1 is the considerable fall in the number of owners after land consolidation. This is the result of two factors:

1. the virtual disappearance of land held in undivided or dual tenure forms;
2. the expropriation of all land below a specified threshold level (one donum in the case of Palechori and two donums in all other schemes).

Also significant is the fall in the total owned area after consolidation. This is a common feature of consolidation programmes where land is set aside

TABLE 5.1

OWNERSHIP STRUCTURE BEFORE AND AFTER CONSOLIDATION, BY HOLDING SIZE GROUP, FOR ALL FIRST PHASE SCHEME HOLDERS

Holding Size Class (donums)	Before Consolidation			After Consolidation		
	Holdings no.	%	Area donums	Holdings no.	%	Area donums
0-1	430	34.3	521	18.6	143.6	2.6
1-2	173	13.8	307	10.9	259.4	4.7
2-5	313	24.9	615	21.9	1052.1	19.3
5-10	198	15.8	577	20.6	1400.3	25.7
10-20	105	8.4	531	18.9	1425.4	26.1
20-30	23	1.8	159	5.7	573.4	10.5
30-50	7	0.5	41	1.5	238.8	4.4
50-100	2	0.1	32	1.1	134.5	2.5
Over 100	2	0.1	23	0.8	225.8	4.1
Total	1253	100.0	2806	100.0	5453.3	100.0

Ave. no. of plots per holding: 2.23	Ave. no. of plots per holding: 1.36
Ave. holding size: 4.35 donums	Ave. holding size: 6.49 donums
Ave. plot size: 1.94 donums	Ave. plot size: 4.75 donums

Source: L.C.A., Nicosia

for road building and irrigation works.

The beta index, described in Chapter 3, was used to determine the level of holding concentration before and after consolidation. The index gave a value of 23.12 before and 36.33 after consolidation, indicating a move to increasing concentration, particularly in the 2 - 5 donum and 5 - 10 donum holding size groups which together contained 80.4% of all owners. Thus, even after consolidation most holders still owned relatively small pieces of land.

A more detailed consideration of the changes in farm structure for the total questionnaire sample of holders is given in Table 5.2. This includes both shape and holding structure indices outlined in more detail in Chapter 2. (The shape index used, it will be remembered, is Hammond and McCullagh's (1978, p. 69) compaction index, whilst the holding structure index (Hs) was devised by the author and described in detail in Section 2.2.3.). The holding structure index rose from 0.63 before to 0.83 after consolidation, clearly demonstrating some improvement in holding structure in those projects sampled. However, it must be noted that the level of structural difficulty measured by the index was not high before consolidation took place. When these changes are examined by holding size groups it is evident that the smaller groups, with higher index values, had less severe structural problems before consolidation than the larger classes. At the same time, the level of index change is greater for these smaller groups, indicating that here the consolidation process has been more successful, while the ability of the consolidation process to deal with all the structural problems of the larger holding groups is somewhat limited.

Individual changes in the variables which make up the index (see Table 5.2) give an indication of the direction of change. As expected, the most significant changes have occurred in the holding area, number of plots and plot size variables. These changes are much larger than those recorded for all holders in Table 5.1 because of the removal of the smaller land owners.

TABLE 5.2

FARM STRUCTURE BEFORE AND AFTER CONSOLIDATION, BY HOLDING SIZE GROUP, FOR TOTAL SAMPLE OF HOLDERS

(n=200)

Holding Size Class (donums)	Ave. Holding Size (donums)		Ave. no. of Plots/Hold- ing		Ave. Plot Size (donums)		Ave. Dis- tance between Plots (km)		Ave. Shape Index		Ave. Holding Structure Index	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
1-2	1.27	1.59	1.40	1.00	0.89	1.59	0.31	0.00	0.35	0.38	0.94	1.00
2-5	2.65	3.20	2.05	1.07	1.25	2.43	0.28	0.11	0.38	0.47	0.81	0.95
5-10	5.93	7.48	2.93	1.45	2.00	4.96	0.40	0.17	0.36	0.47	0.65	0.82
10-20	11.49	12.97	4.40	1.77	2.87	7.85	0.89	0.24	0.35	0.48	0.46	0.80
Over 20	28.37	33.54	7.55	2.45	3.76	13.94	0.98	0.52	0.34	0.44	0.30	0.58
Mean	9.94	11.75	3.66	1.55	2.15	6.15	0.57	0.20	0.35	0.47	0.63	0.83

Source: Author's questionnaire survey

Mean holding area increased from 9.94 donums to 11.75 donums and the level of fragmentation fell from 3.66 plots to 1.55 plots per holding. Plot sizes have shown the largest increase rising from 2.15 donums to 6.15 donums, although the change in this variable has been most significant for the larger holding groups. Rather less dramatic have been changes in plot shape. The mean shape index has increased from 0.35 to 0.47 indicating some movement towards plot compaction. The change in this variable is not as significant as originally conceived in the consolidation process. Changes in the mean distance between plots, a measure of the spatial effect of fragmentation, are more notable. Before consolidation the mean distance was 0.57 kilometres; after consolidation it fell to 0.20 km.

5.1.2. Structural Change at the Village Level

Structural changes in the individual First Phase villages deviate quite markedly from the general view just presented. These variations reflect both the operation of different spatial processes and the effect of specific environmental locations. Each village will be discussed in turn.

The changes in the plot network in Palechori can clearly be seen in the cadastral plans before and after consolidation (Figure 5.1). Prior to consolidation the project area was characterized by a patchwork of small, irregularly-shaped fields. After consolidation, these were replaced by plots that were both larger and of a more regular shape.

Table 5.3 provides a numerical record of Palechori's structural change. The table indicates that the level of fragmentation before consolidation was not particularly high but local common knowledge contradicts this. The low figure in the table may be partly explained by the scheme's large proportion of small holders who usually only have one plot per holding. If these are excluded from the calculations the average would be 2.5 plots per holding, a more representative figure. Examination of specific holding size groups indicates that fragmentation levels increase rapidly after 10 donums. After consolidation fragmentation levels have

FIGURE 5.1 CADASTRAL PLAN BEFORE AND AFTER CONSOLIDATION: PALECHORI

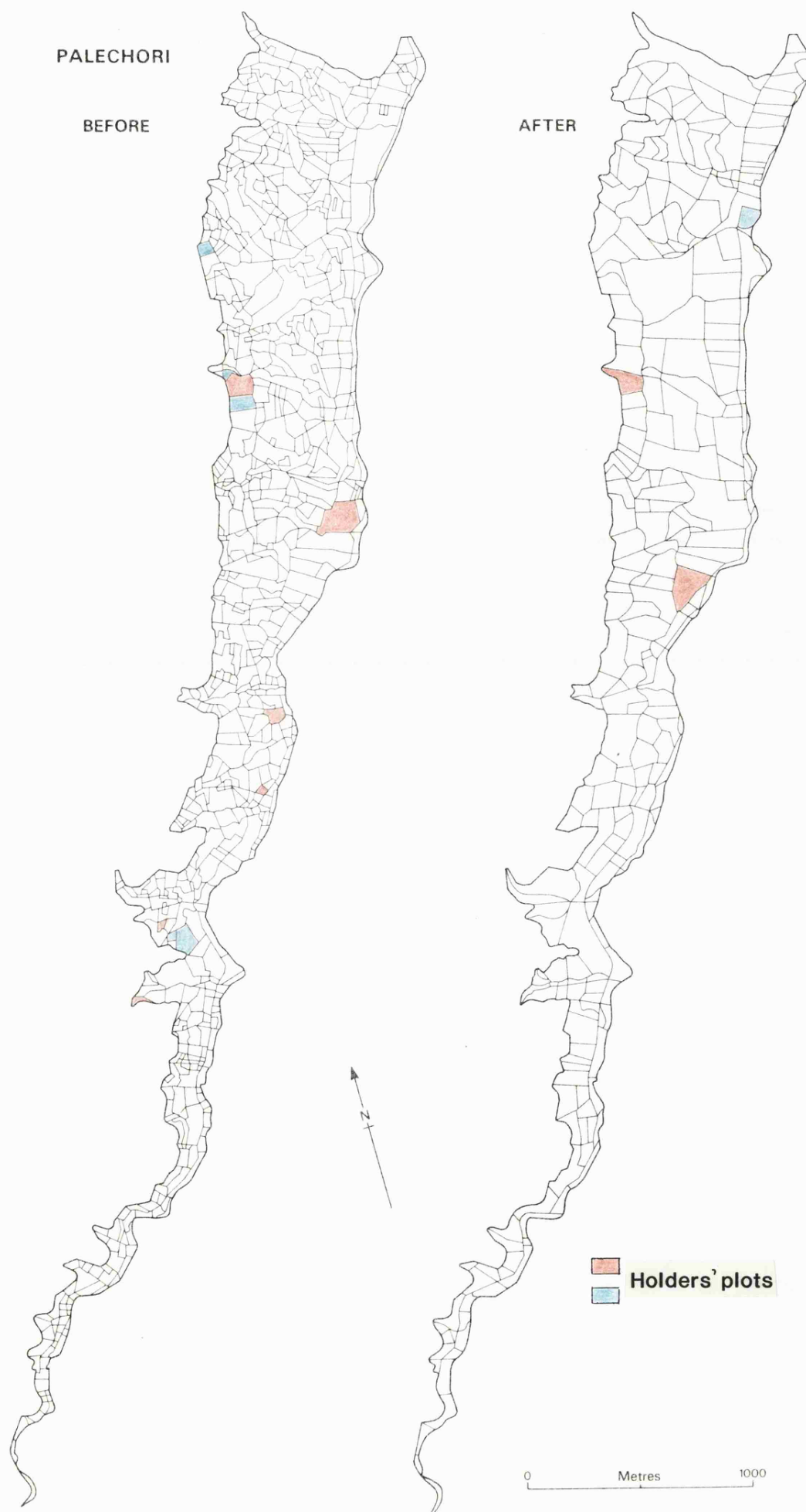


TABLE 5.3

OWNERSHIP STRUCTURE BEFORE AND AFTER CONSOLIDATION: PALECHORI

Holding Size Class (donums)	Before Consolidation			After Consolidation		
	Holdings no.	Plots no.	Area donums %	Holdings no.	Plots no.	Area donums %
0-1	124	38.9	147	23.2	50.1	5.0
1-2	58	18.2	99	15.6	86.5	8.6
2-5	81	25.4	159	25.0	268.7	26.8
5-10	41	12.9	120	18.9	279.2	27.8
10-20	10	3.1	44	6.9	139.3	13.8
20-30	3	0.9	19	3.0	76.1	7.6
30-50	1	0.3	16	2.5	34.2	3.4
50-100	1	0.3	31	4.9	70.0	7.0
Over 100						
Total	319	100.0	635	100.0	1004.1	100.0
Average no. of plots per holding: 2.0						
Average holding size: 3.14 donums						
Average plot size: 1.58 donums						
Average number of plots per holding: 1.2						
Average holding size: 5.28 donums						
Average plot size: 4.36 donums						
	186	100.0	225	100.0	982.4	100.0

Source: L.C.A., Nicosia

fallen for all holding size groups, but most significantly for the larger ownership classes. Average holding sizes have increased by just over two donums while plot sizes have increased more rapidly from 1.58 donums to 4.36 donums. Other forms of ownership, especially multiple tenures, accounted for 10% of the land in the project area before consolidation. The majority of plots held in this form were holdings of one donum or less and a major feature of the consolidation process has been the elimination of this tenure form.

Changes in farm structure for the interview sample of holders from Palechori (Table 5.4) have been much more impressive than those revealed by figures from the total sample. Particularly noticeable has been the change in the holding structure index which has increased from 0.51 to 0.90 after consolidation. Changes for some of the larger holding size groups, especially the 10 - 20 donum and more than 20 donum classes, are even more spectacular. The low index prior to consolidation is a reflection of the high level of structural difficulty of the Palechori sample, with extreme land fragmentation and spatial separation of plots (an average distance of 0.77 km. between plots). This was partly the result of the difficult terrain and the need for a variety of land-use types, but on the whole it derives from the irrational division of land. After consolidation the degree of fragmentation has been significantly reduced, with the mean number of plots per holding falling to 1.28. Spatial separation has also shown a significant decline to 0.27 km. The fall in fragmentation has led to a big increase in mean plot size, from 2.78 donums to 6.21 donums. However, the mean area per holding has risen only slightly and there has been little movement towards plot compaction.

By contrast the Kissonerga project cadastral maps (Figure 5.2) show that the pre-consolidation situation was more favourable here than for Palechori. The general appearance is one of only slight modification.

The picture provided by the cadastral maps alone, however, is rather

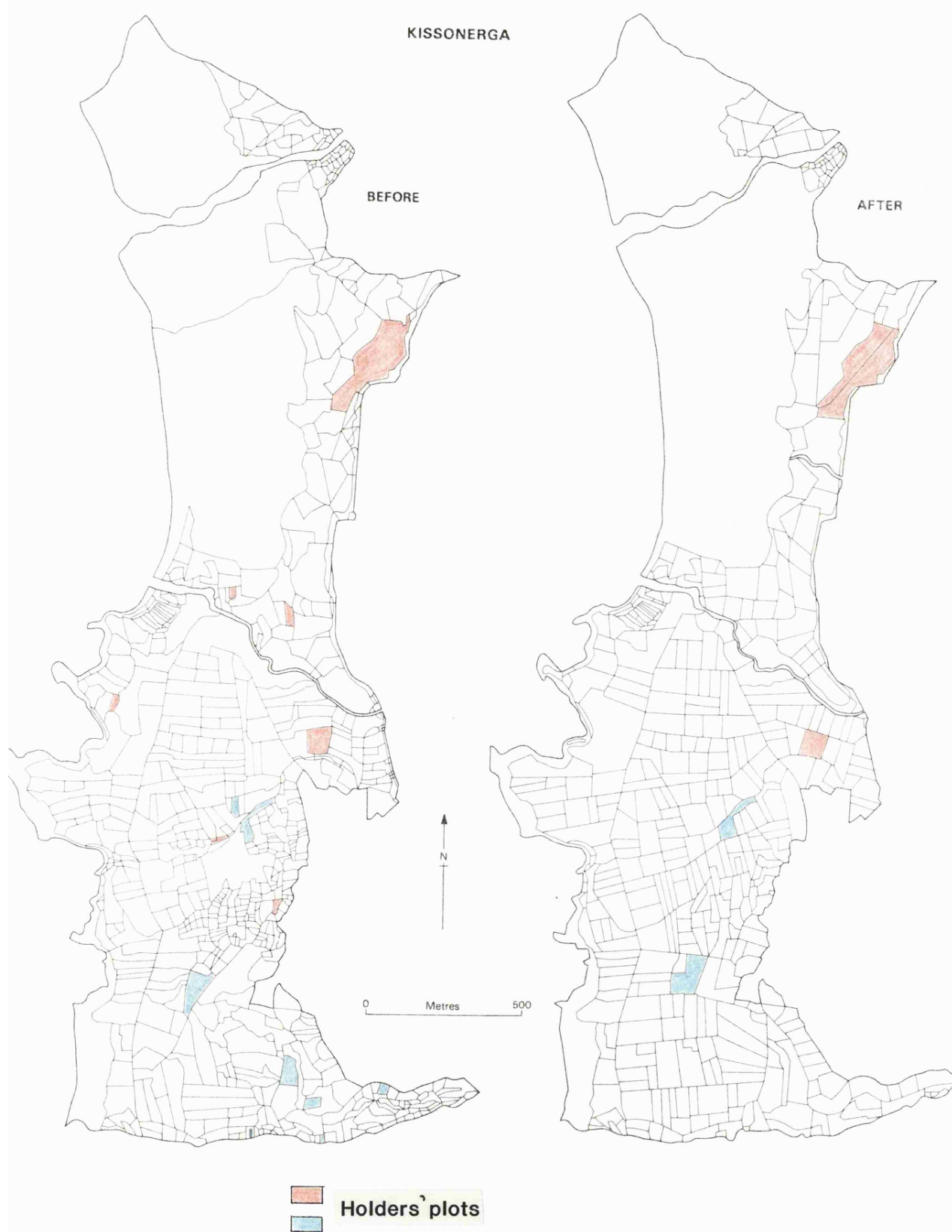
TABLE 5.4

FARM STRUCTURE BEFORE AND AFTER CONSOLIDATION: PALECHORI SAMPLE (n=50)

Holding Size Class (donums)	Ave. Holding Size (donums)		Ave. no. of Plots/ Holding		Ave. Plot Size (donums)		Ave. Distance Between Plots (km)		Ave. Shape Index		Ave. Holding Structure Index	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
1-2	1.27	1.59	1.4	1.0	0.89	1.59	0.31	0.00	0.35	0.38	0.94	1.00
2-5	4.02	3.75	2.5	1.2	1.58	2.95	0.66	0.28	0.33	0.33	0.75	0.93
5-10	5.80	7.00	3.1	1.2	1.84	5.60	0.95	0.33	0.35	0.45	0.65	0.93
10-20	16.81	12.58	4.1	1.0	4.08	12.58	1.15	0.00	0.34	0.42	0.30	1.00
Over 20	31.90	36.60	9.0	2.0	3.55	18.33	0.80	0.75	0.34	0.31	0.28	0.64
Mean	9.96	12.30	3.5	1.3	2.38	8.21	0.77	0.27	0.34	0.38	0.51	0.90

Source: Author's questionnaire survey

FIGURE 5.2 CADASTRAL PLAN BEFORE AND AFTER CONSOLIDATION: KISSONERGA



misleading for data on the size of ownership and the number of plots (Table 5.5) show rather more significant changes. Before consolidation more than 50% of holders owned land below two donums, once again indicating the dominance of small ownership groups in the project areas. However, in this scheme more land has been made available for plot enlargement and the threshold limit of two donums has been imposed because there were fewer owners with very small holdings. After consolidation the ownership pattern showed an important change with more holders, 78.5%, owning land in the 2 - 5 donum and 5 - 10 donum groups.

Land fragmentation before consolidation was fairly high in Kissonerga, with an average of 2.7 plots per holding. However, some of the larger holding groups had much higher figures, especially the 10 - 20 donum group with an average of 6.1 plots per holding. After consolidation both this figure and the average for the total number of holders had shown a significant fall to 1.6 plots per ownership. Holding sizes showed an increase of nearly three donums on average and plot sizes increased by about the same amount, from 1.7 donums to 4.8 donums.

Other forms of tenure have also shown a significant change. Compared to the other schemes under consideration Kissonerga, with 24.8% of the area held in undivided shares, contained the largest proportion of this tenure form. After consolidation these covered only 0.02% of the total area falling within the 5 - 10 donum holding group.

Investigation into the changes in farm structure for the Kissonerga sample of holders (Table 5.6) reveals further notable differences from the situation in Palechori. The increase in the mean holding structure index from 0.61 to 0.75 is much lower, while the level of structural difficulty preceding consolidation does not appear to have been great. The most significant change for this sample has been the reduction in mean fragmentation levels from 3.52 to 1.70 plots per holding and the consequent increase in mean plot size from 2.35 donums to 5.81 donums. The mean holding area has

TABLE 5.5

OWNERSHIP STRUCTURE BEFORE AND AFTER CONSOLIDATION: KISSONERGA

Holding Size Class (donums)	Before Consolidation				After Consolidation			
	Holdings no.	%	Plots no.	Area donums	Holdings no.	%	Plots no.	Area donums
0-1	165	41.8	202	19.2	104	48.6	112	341.5
1-2	38	9.6	93	8.9	64	29.9	105	471.8
2-5	77	19.5	158	15.0	35	16.3	86	488.3
5-10	53	13.4	213	20.2	7	3.3	21	158.3
10-20	49	12.4	297	28.2	4	1.9	10	149.4
20-30	9	2.3	60	5.7				
30-50	3	0.8	15	1.4				
50-100								
Over 100	1	0.2	15	1.4				
Total	395	100.0	1053	100.0	214	100.0	334	1609.5
								100.0

Average no. of plots per holding:	1.6
Average holding size:	7.5 donums
Average plot size:	4.8 donums

Source: L.C.A., Nicosia

CHANGES IN FARM STRUCTURE BEFORE AND AFTER CONSOLIDATION: KISSONERGA SAMPLE (n=50)

Holding Size Class (donums)	Ave. Holding Size (donums)		Ave. no. of Plots/Holding		Ave. Plot Size (donums)		Ave. Distance Between Plots (km)		Ave. Shape Index		Ave. Holding Structure Index	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
2-5	2.74	3.34	2.1	1.1	1.30	3.03	0.20	0.02	0.38	0.43	0.82	0.94
5-10	7.00	8.03	3.1	1.9	2.28	4.31	0.22	0.15	0.32	0.48	0.55	0.66
10-20	15.09	13.28	6.8	2.5	2.20	5.31	1.22	0.71	0.32	0.57	0.28	0.49
Over 20	25.70	31.81	7.0	3.0	3.67	10.60	1.18	0.64	0.39	0.55	0.26	0.48
Mean	7.41	7.88	3.5	1.7	2.36	5.81	0.45	0.28	0.35	0.50	0.61	0.75

Source: Author's questionnaire survey

increased only marginally and in the case of the 10 - 20 donum group has actually shown a decrease. The shape index after consolidation has shown a more positive movement towards plot compaction, changing from 0.35 before to 0.50 after consolidation. However, plots are still far from having a totally rational shape. Distances between plots are much less than Palechori, reflecting partly the gentle terrain and similarity of land-use types. The mean distance of plots per holding fell from 0.72 km. before consolidation to 0.45 km. after consolidation, indicating that the problem of spatial separation has not yet been fully resolved in the Kissonerga project area.

In the Khlorakas project area the comparison of cadastral plans (Figure 5.3) does not appear to reveal any striking change after the consolidation process. However, there are some exceptions to this general picture with the greatest change in plot shape and size occurring in those plots that lie close to the village centre.

This view of only limited impact is further confirmed when numerical changes in the size of ownership and the number of plots are considered (Table 5.7). The low proportion of small holders is indicative of the relatively low levels of structural difficulty in this area. Average land fragmentation levels are low with only 1.7 plots per holding before consolidation. Even in the larger holding size groups the level of fragmentation is not as high as in other schemes, except in the 20 - 30 donum class where there was an average of 6 plots per holding prior to consolidation. As a result average holding and plot sizes are comparatively large. After consolidation land fragmentation was reduced to an average of 1.3 plots per holding although the 20 - 30 donum group still had an average of 2.7 plots per holding. Plot and holding sizes increased by nearly two donums but the general picture after consolidation is one of only modest change. However, land held in undivided shares has shown a remarkable reduction. Before consolidation this tenure form covered 16% of the project area with the majority of the owners falling in the less-than-one donum holding group. After consolidation un-

FIGURE 5.3 CADASTRAL PLAN BEFORE AND AFTER CONSOLIDATION: KHLORAKAS

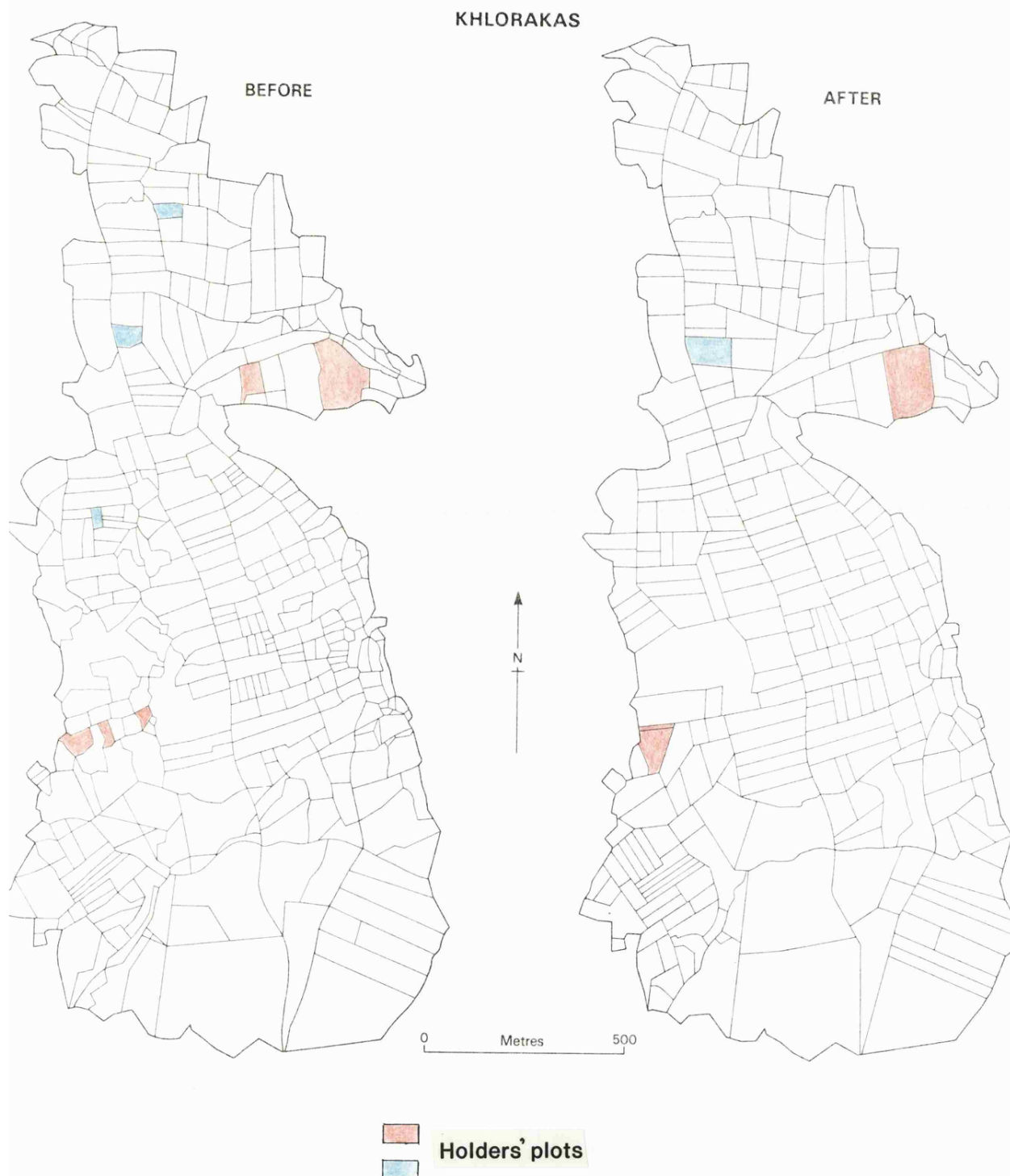


TABLE 5.7

OWNERSHIP STRUCTURE BEFORE AND AFTER CONSOLIDATION: KHLORAKAS

Holding Size Class (donums)	Before Consolidation			After Consolidation		
	Holdings no.	%	Area donums	Holdings no.	%	Area donums
0-1	73	26.3	85	17.7	33.0	2.3
1-2	31	11.1	39	8.1	48.2	3.3
2-5	82	29.5	123	25.6	281.4	19.3
5-10	60	21.6	112	23.3	419.0	28.8
10-20	21	7.5	64	13.3	281.8	19.3
20-30	7	2.5	43	8.9	160.5	11.0
30-50	2	0.7	6	1.2	63.8	4.4
50-100	1	0.4	1	0.2	64.5	4.5
Over 100	1	0.4	8	1.7	103.8	7.1
Total	278	100.0	481	100.0	1456.0	100.0

Average no. of plots per holding: 1.7	Average no. of plots per holding: 1.3
Average holding size: 5.2 donums	Average holding size: 6.9 donums
Average plot size: 3.0 donums	Average plot size: 5.2 donums

Source: L.C.A., Nicosia

TABLE 5.8

CHANGES IN FARM STRUCTURE BEFORE AND AFTER CONSOLIDATION: KHLORAKAS SAMPLE (n=50)

Holding Size Class (donums)	Ave. Holding Size (donums)		Ave. no. of Plots/ Holding		Ave. Plot Size (donums)		Ave. Distance Between Plots (km)		Ave. Shape Index		Ave. Holding Structure Index	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
2-5	2.04	3.61	2.0	1.0	1.02	3.61	0.14	0.02	0.41	0.51	0.83	0.95
5-10	6.78	9.27	2.9	1.7	2.34	5.32	0.18	0.09	0.36	0.42	0.62	0.77
10-20	14.91	17.03	5.8	2.5	2.57	6.78	0.74	0.14	0.37	0.68	0.54	0.78
Over 20	32.70	41.21	6.2	2.7	4.54	15.15	0.92	0.37	0.32	0.48	0.47	0.43
Mean	14.10	17.78	2.5	2.0	2.61	7.79	0.49	0.15	0.37	0.58	0.69	0.73

Source: Author's questionnaire survey

divided shares had virtually disappeared, covering only 0.01% of the total area.

Changes in the farm structure for the sample of holders from this scheme reveal a similar trend (Table 5.8). The index of holding structure, relatively high before land consolidation at 0.69, has improved only slightly to 0.73, a lower level of change than the other Phase One projects. However, the mean plot size and mean plot area figures have shown a significant increase. Average holdings, for all holding size groups, rose from 14.10 donums to 17.78 donums while average plot sizes increased more rapidly from 2.61 donums to 7.79 donums. The level of land fragmentation, slightly higher than that recorded for the total sample of holders, has shown only a slight decrease from 2.47 plots per holding to 1.99 plots per holding. Significantly, though, the consolidation process appears to have been a success in solving the problems of plot dispersion and rationalizing plot shape. The average distance between plots fell from 0.49 km. before consolidation to 0.15 km. after consolidation. These changes were more significant in the larger holding size groups. For example, in the 10 - 20 donum class the average distance between plots per holding fell from 0.74 kilometres to 0.14 kilometres. Plot shape has shown a definite move towards compaction with the shape index increasing from 0.37 to 0.58 after consolidation.

Finally, in Akrounda and Phinikaria, two neighbouring schemes, the effect of the consolidation process on holding structure is impressive. Visually the changes are less striking for the Phinikaria project except in one segment in the extreme north (Figure 5.4). Comparison of the cadastral plans for the Akrounda project area indicate a more radical change (Figure 5.5). In this scheme the large number of small and irregularly-shaped plots is reminiscent of the situation in Palechori where the terrain, although slightly more rugged, is much the same. After consolidation many of the very small plots have disappeared, replaced by fields with more regular boundaries.

FIGURE 5.4 CADASTRAL PLAN BEFORE AND AFTER CONSOLIDATION: PHINIKARIA

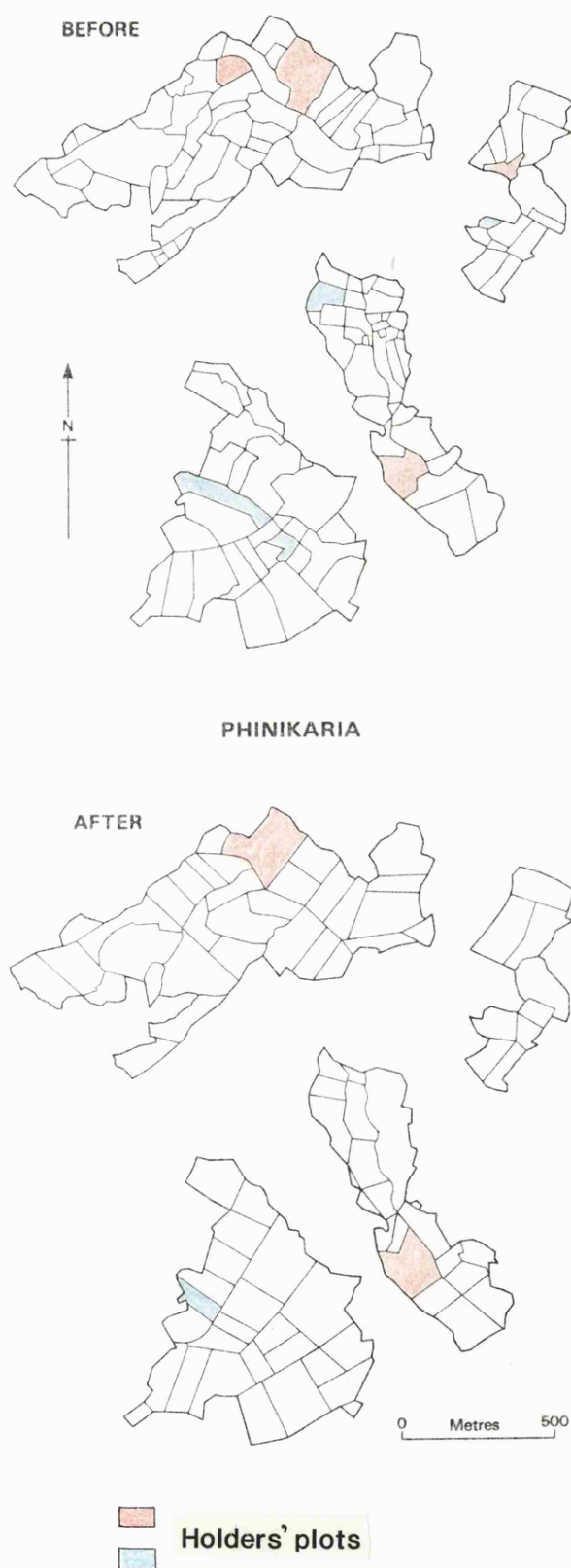
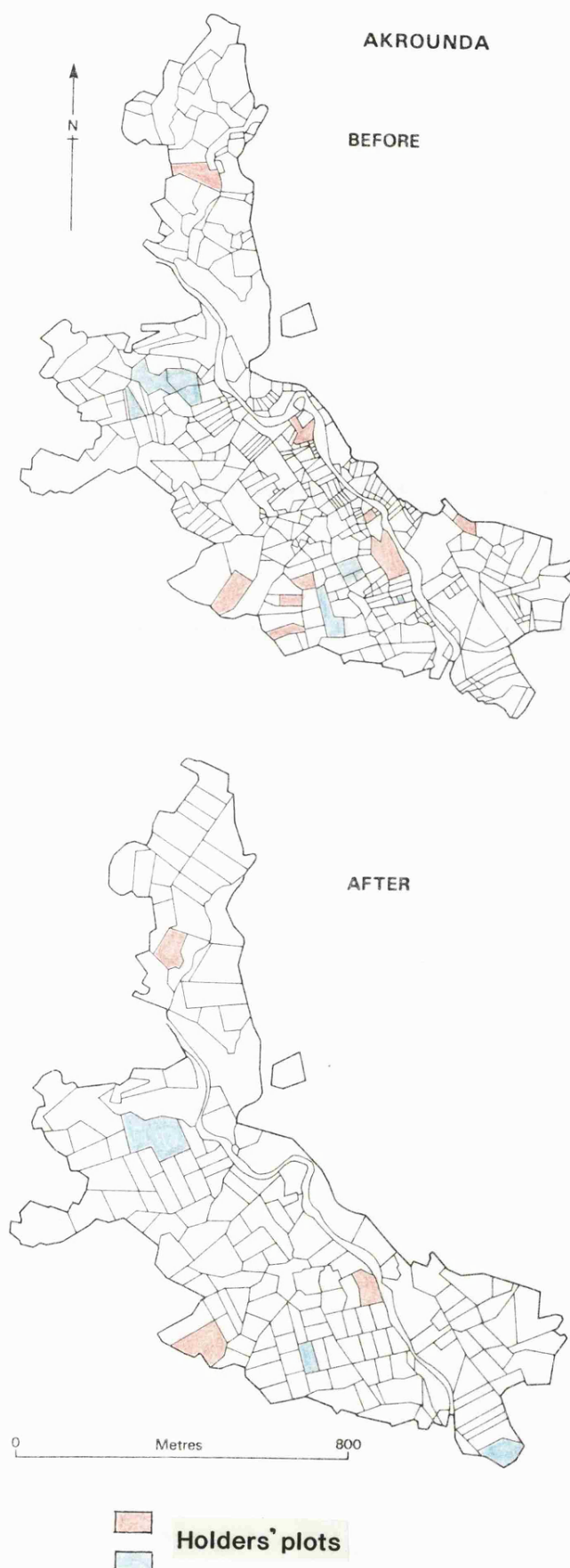


FIGURE 5.5 CADASTRAL PLAN BEFORE AND AFTER CONSOLIDATION: AKROUNDA



When information on the size of ownership and number of plots is considered the differences in holding structure between the two schemes are more evident (Tables 5.9 and 5.10). In Phinikaria nearly 50% of holders before consolidation were in the 2 - 5 donum and 5 - 10 donum holding groups. After consolidation this concentration was reinforced with 79.5% of holders in these groups. In contrast, in Akrounda there was a much larger number of smaller holders before consolidation, confirming the visual pattern from the cadastral plans. After consolidation 61.2% of owners were concentrated in the 2 - 5 donum group. Land fragmentation was also more severe in this area with an average of 2.8 plots per holding before consolidation, although the 10 - 20 and 20 - 30 holding groups, with 6.0 and 11.0 plots per holding, have much higher levels. After consolidation, fragmentation declined in both schemes to just over one plot per holding, although the fall was most significant in the Akrounda project area. Average holding and plot sizes in Phinikaria, larger to start with than Akrounda, have shown considerable increases. Average holding size rose from 5.1 donums to 7.3 donums and average plot size from 2.9 donums to 5.8 donums. In Akrounda change was less striking with average holding sizes increasing from 4.0 donums to 5.3 donums and plots from 1.4 donums to 3.8 donums.

Multiple tenures were also an important characteristic of the ownership pattern in the two schemes. In Akrounda 23% of the project area was held in undivided shares before consolidation. At Phinikaria the figure was much less with only 12% of the area held in this form. In common with the other schemes, this tenure type virtually disappeared after consolidation although it still accounts for 5.2% of the total area in the Phinikaria project.

Changes in farm structure for the questionnaire sample of holders from both villages further demonstrates the effect of the consolidation process (Table 5.11). The holding structure index has increased from 0.67 to 0.92, indicating that considerable success has been achieved in improving the

OWNERSHIP STRUCTURE BEFORE AND AFTER CONSOLIDATION: PHINIKARIA

Holding Size Class (donums)	Before Consolidation				After Consolidation			
	Holdings no.	%	Plots no.	Area donums	Holdings no.	%	Plots no.	Area donums
0-1	24	24.8	29	17.0	9.5	1.9		
1-2	14	14.4	16	9.4	23.3	4.7		
2-5	26	26.8	45	26.3	93.1	18.7		
5-10	21	21.7	38	22.2	160.0	32.2		
10-20	10	10.3	35	20.5	152.8	30.7		
20-30	1	1.0	4	2.3	27.8	5.6		
30-50	1	1.0	4	2.3	30.8	6.2		
50-100								
Over 100								
Total	97	100.0	171	100.0	497.3	100.0	79	100.0
Average no. of plots per holding: 1.7								
Average holding size: 5.1 donums								
Average plot size: 2.9 donums								
Average no. of plots per holding: 1.3								
Average holding size: 7.3 donums								
Average plot size: 5.8 donums								

Source: L.C.A., Nicosia

TABLE 5.10

OWNERSHIP STRUCTURE BEFORE AND AFTER CONSOLIDATION: AKROUNDA

Holding Size Class (donums)	Before Consolidation				After Consolidation			
	Holdings no.	%	Plots no.	Area donums	Holdings no.	%	Plots no.	Area donums
0-1	44	26.6	58	20.7				
1-2	32	19.5	60	45.8				
2-5	47	28.7	130	150.1	63	61.2	67	176.4
5-10	23	14.7	94	177.1	28	27.2	48	197.6
10-20	15	9.1	91	187.2	11	10.6	26	139.2
20-30	3	1.8	33	72.0				
30-50					1	1.0	3	30.1
50-100								
Over 100								
Total	164	100.0	466	652.9	103	100.0	144	543.3
				100.0				100.0

Average no. of plots per holding: 2.8	Average no. of plots per holding: 1.4
Average holding size: 4.0 donums	Average holding size: 5.3 donums
Average plot size: 1.4 donums	Average plot size: 3.8 donums

Source: L.C.A., Nicosia

TABLE 5.11

CHANGES IN FARM STRUCTURE BEFORE AND AFTER CONSOLIDATION: AKROUND/PHINIKARIA SAMPLE (n=50)

Holding Size Group (donums)	Ave. Holding Size (donums)		Ave. no. of Plots/ Holding		Ave. Plot Size (donums)		Ave. Distance Between Plots (km)		Ave. Shape Index		Ave. Holding Structure Index	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
2-5	1.81	2.13	1.6	1.0	1.13	2.13	0.13	0.00	0.41	0.62	0.87	1.00
5-10	4.17	5.62	2.7	1.0	1.54	5.62	0.24	0.00	0.43	0.54	0.81	0.94
10-20	8.96	14.02	3.4	1.1	2.63	6.74	0.47	0.14	0.38	0.57	0.49	0.93
Over 20	23.21	24.56	7.0	2.1	3.31	11.69	1.01	0.32	0.31	0.51	0.32	0.78
Mean	9.53	11.58	3.7	1.3	2.15	6.29	0.46	0.14	0.28	0.56	0.62	0.92

Source: Author's questionnaire survey

ownership pattern. The relatively high index before consolidation may be partly explained by the low level of structural difficulty found in the holders from Phinikaria. Some of the most significant changes have been in the improvement of plot shape and the reduction in average distance between plots. Plots have become more compact with an index change from 0.28 to 0.56. Average distances between plots have been substantially reduced from 0.46 km. before consolidation to 0.14 km. afterwards. Fragmentation levels have also fallen considerably with the average number of plots per holding declining from 3.61 before consolidation to 1.3 after consolidation. Holding sizes have increased on average by seven donums while plot sizes have shown a substantial rise from 2.15 donums to 6.29 donums.

5.2. LAND-USE CHANGES

Changes in land-use have been one of the most significant visual impacts of land consolidation on the agrarian landscape in Cyprus. In this section land-use changes are examined for a period of, first, three and then seven years after the completion of First Phase projects, i.e. for 1977 and 1981. The 1971 (before consolidation) and 1977 (three years after consolidation) land-use data are from the Land Consolidation Service's records; the 1981 maps were compiled by the author in the field. The comparative analysis is based on percentage data because the total area covered by the schemes decreased slightly after land consolidation. Following the pattern established in the previous section on holding structure changes, data relating to the total area covered by land consolidation activities in the primary phase schemes are discussed first. Next, information relating to individual villages is presented. Finally, consideration is given to the land-use data from the sample of holders interviewed in each village.

5.2.1. Land-Use Before and After Consolidation in Phase One Projects

It is clear from Table 5.12 that there have been considerable changes in land-use between the three survey years. Most remarkable have been the reduction in the uncultivated area, the introduction of new crops and the

TABLE 5.12CHANGES IN LAND-USE AFTER CONSOLIDATION: PHASE ONE PROJECTS

Crop Type	Before Consolidation (1971)		3 Years After Consolidation (1977)		7 Years After Consolidation (1981)	
	donums	%	donums	%	donums	%
Vegetables	1597.75	29.30	1557.01	31.15	1421.09	28.43
Cereals	1046.44	19.82	766.25	15.33	680.23	13.61
Vines	242.15	4.44	170.60	3.41	73.83	1.42
Carobs	9.00	0.16	51.00	1.02	12.00	0.24
Cultivated Trees	3.48	0.06	74.30	1.48	307.64	6.14
Bananas	107.10	1.36	219.00	4.38	829.76	16.30
Citrus	40.05	0.73	141.07	2.86	341.30	6.82
Strawberries	0.00	0.00	0.00	0.00	42.21	0.84
Uncultivated	2406.33	44.13	2018.07	40.37	1309.74	26.20
Total	5452.30	100.00	4997.30	100.00	4997.30	100.00

Source: L.C.A., Nicosia and Author's field work

consequent decline in the more traditional land-uses such as cereals and vines. In 1971 uncultivated land accounted for 44.13% of the total land area. Three years after consolidation this had fallen slightly to 40.37%. However, during the next four years the uncultivated area fell by 34%, from 2018.07 donums to 1309 donums. In 1981 the uncultivated area occupied only 26.20% of the total agricultural land. Simultaneously has come a decline in some of the more traditional crops. For example, cereals which covered 19.82% of the total area in 1971 accounted for 15.33% in 1977 and, by 1981, had fallen to 13.61%. Vines show a similar pattern, although falling more gradually from 4.44% in 1971 to 1.42% in 1981. Carobs, another traditional product, showed an initial increase up to 1977, but then fell to 0.24% of the agricultural area in 1981.

The decline of traditional crops has been balanced by the increase of other land-use types. Most notable has been the rapid growth of bananas. In 1971 these covered only 1.36% of the total agricultural area. By 1977 they had increased to 4.38% and four years later in 1981 had quadrupled to cover 16.30% of the area. Cultivated trees, mostly olives and almonds, have also continued to increase in importance. In 1971 they occupied only 0.06% of the agricultural area but, by 1981, had increased to 6.14%, the most significant growth having occurred after 1977. Citrus cultivation has shown a similar trend, increasing from 0.73% in 1971 to 6.82% in 1981. A new crop, strawberries, has made a recent appearance although only covering a very small percentage of the total land area.

While description of Table 5.12 has revealed broad changes in land-use occurring after consolidation, there are considerable variations between the sample villages. These are discussed in more detail below. At this point we should also note the importance of allowing an adequate time to pass before an evaluative study is carried out. In this study relatively few changes had taken place three years after the completion of projects; but within the next four years considerable changes occurred.

5.2.2. Land-Use Changes at the Village Level

In the Palechori project area land-use changes have been rather more dramatic than those indicated by the aggregate figures just described. Most startling has been the rapid decline in the uncultivated area between 1977 and 1981 (see Figure 5.6). This fell from 511.3 donums to 170.2 donums, a reduction of 67.7%. This has been accompanied by a rapid increase in the areas devoted to vegetables, olives, almonds and other deciduous trees which in total now cover 74.85% of the project area, compared with 46.57% in 1977 and only 20.02% in 1971. Vines, covering 9.42% of the area in 1971, have declined in importance now accounting for less than 1%. Cereals have made a re-appearance after completely disappearing after consolidation, though the total area covered by this crop has fallen slightly from 5.0% in 1971 to 3.14% in 1981. Replacing vines and cereals has been strawberries - a new crop in this highland village. These developed rapidly after 1977 and are limited to this consolidation scheme, covering 4.22% of its total area.

In Kissonerga village land-use changes have also been significant (see Figure 5.7). In contrast to Palechori the size of the uncultivated area showed an increase immediately after consolidation. However, since 1977, this has fallen from 633.40 donums to 452.14 donums, a reduction of 28.61%. It is now slightly above the pre-consolidation level. Vines, cereals and vegetables all declined between 1971 and 1981, the main reason being the quite explosive growth of banana plantations in the project area. Although not an entirely new crop for this zone their area increased ten-fold between 1971 and 1981. More recently citrus groves have made an appearance, covering 1.56% of the project area in 1981.

In nearby Khlorakas land consolidation appears to have made less impact on the agricultural land use (Figure 5.8). Before consolidation 38.15% of the area was left uncultivated and the main land use was vegetables which covered 44.20% of the total agricultural area. Cereals accounted for 14.9% of agricultural land while bananas, vines and carobs all occupied much

FIGURE 5.6 LAND-USE CHANGES IN PALECHORI

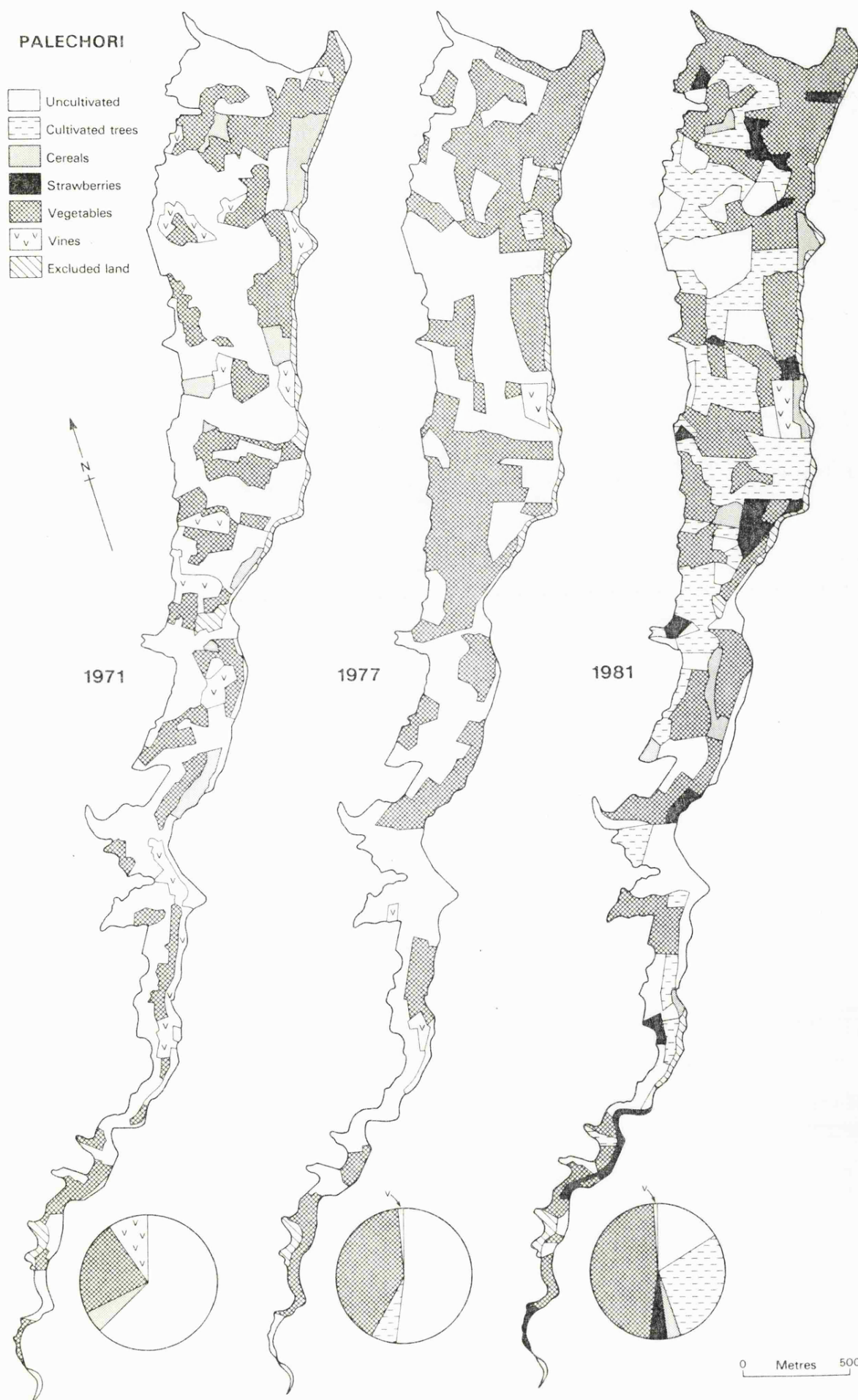
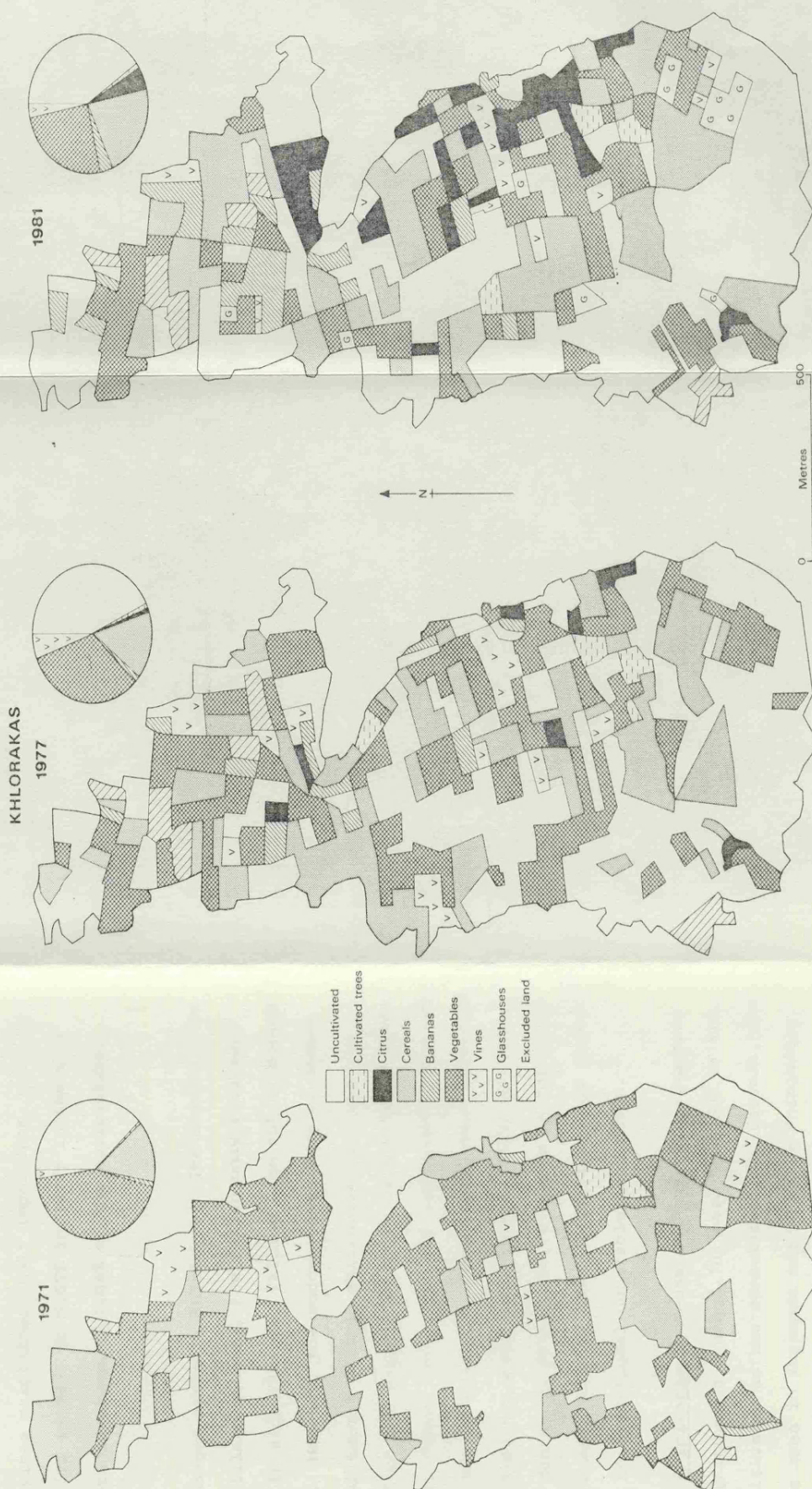


FIGURE 5.7. LAND-USE CHANGES IN KISSONERGA



FIGURE 5.8 LAND-USE CHANGES IN KHLORAKAS



smaller areas. Three years after consolidation the picture had changed as follows. The uncultivated area increased to 42.80% of agricultural land, although the change was smaller than that recorded by neighbouring Kissonerga. Surprisingly, as Khlorakas is nicknamed the 'tomato and cucumber village', vegetables showed a rapid decline and in 1977 covered 32.12% of the area. Land devoted to bananas and carobs increased slightly. In contrast to the other project areas cereals and vines maintained their importance, with the latter increasing rapidly from 1.7% in 1971 to 5.67% in 1977; in the same year citrus made its first appearance covering 1.04% of the agricultural area.

By 1981 the picture had changed again in Khlorakas. The uncultivated area, in contrast to the other village schemes, had fallen only slightly. Vegetables continued to decline in significance, falling from 451.01 donums in 1977 to 358.7 donums in 1981. However, the sudden appearance of greenhouses has transformed the visual impact of this particular land use and these structures now cover 7.08% of the total area under vegetables. Again in contrast to the other schemes, cereal production has continued to expand - from 224.02 donums in 1977 to 306.42 donums in 1981. Vines have decreased slightly while the area under carobs has remained stable. Citrus has made rapid progress rising from 14.7 donums in 1977 to 77.74 donums in 1981. In the same period the area under bananas rose by 58%. These two crops appear to have expanded at the expense of traditional vegetable production.

Eastwards in Akrounda and Phinikaria land-use changes have also been marked. In both project areas (Figures 5.9 and 6.10) more than 60% of the agricultural area was left uncultivated before consolidation. Cereals, the main crop, covered 30.24% of the area in Akrounda and 20.6% in Phinikaria. Vines and citrus occupied much smaller areas although vegetables were significant in Phinikaria, covering 14.5% of the area. Three years after consolidation the uncultivated area had fallen considerably, following a similar pattern to the Palechori scheme. Cereals continued to account for a large

FIGURE 5.9 LAND-USE CHANGES IN PHINIKARIA

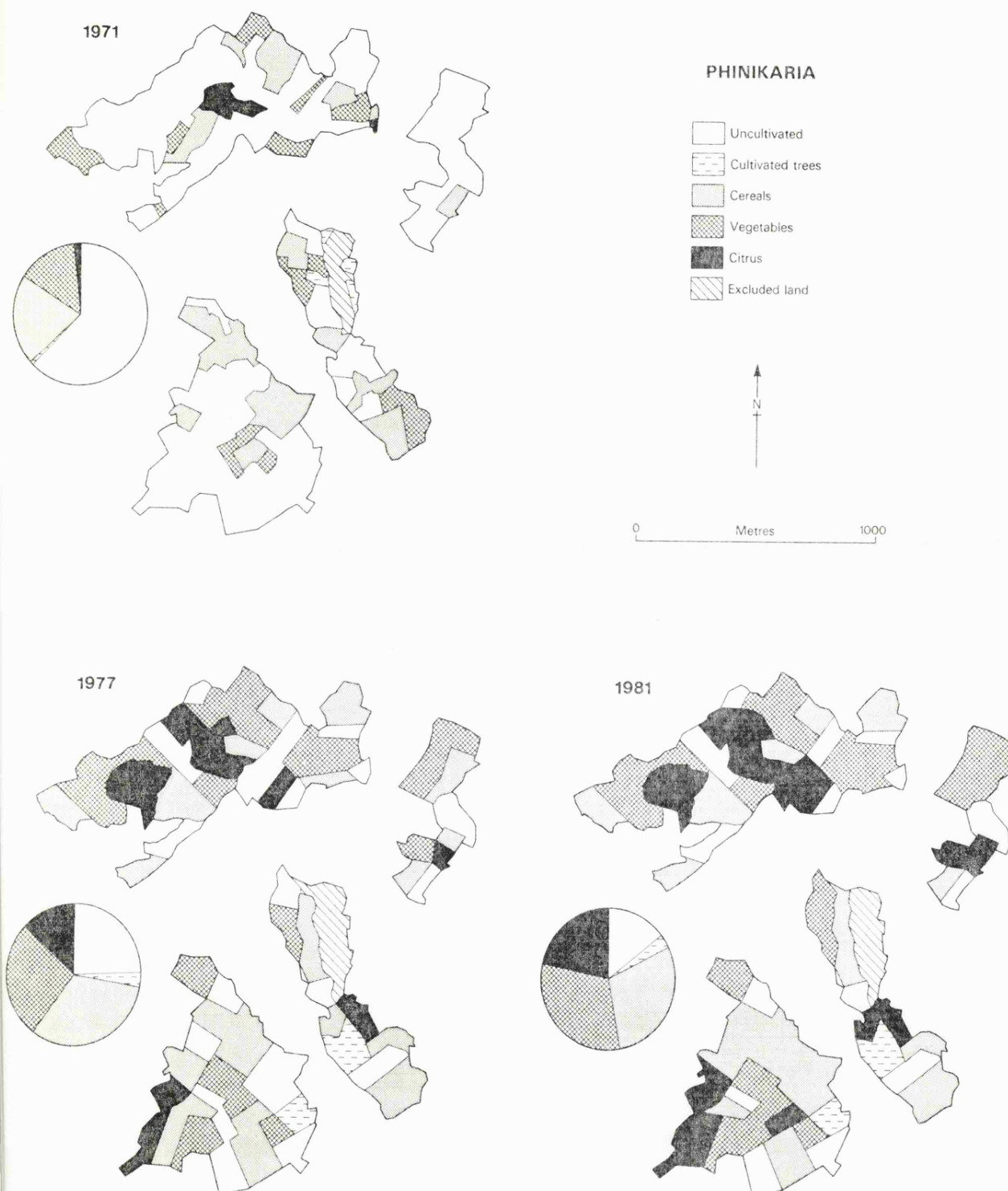
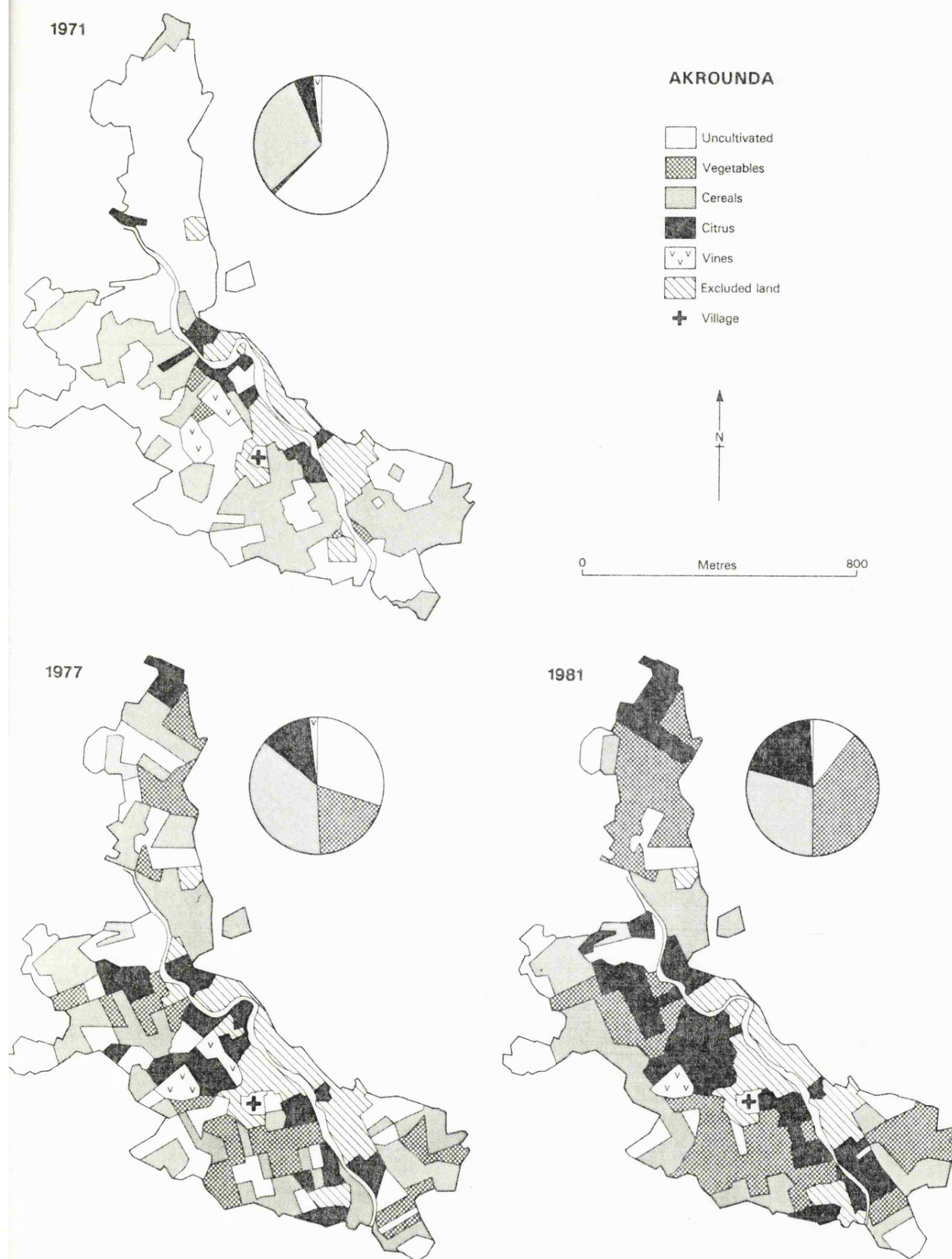


FIGURE 5.10 LAND-USE CHANGES IN AKROUNDA



proportion of the total cultivated area while land covered by citrus and vegetables has increased considerably. By 1981 the trends evident in 1977 had become more established. Uncultivated land continued to shrink in both schemes. Vines and cereals declined marginally in importance while the area under citrus increased significantly in Akrounda, rising from 66.3 donums in 1977 to 120.3 donums in 1981. The area devoted to vegetables also rose rapidly in Akrounda; their increase in Phinikaria was only slight. In the latter scheme cultivated trees, mostly olive and almond, had made a steady growth since consolidation and in 1981 covered 3.16% of the project area.

Not only have there been changes in the type and extent of cropping patterns after consolidation, there have also been significant zonal shifts in land-use types in relation to distance from the village centre. In accordance with the Von Thunen agricultural land-use model this was not unexpected since the effect of land consolidation is to reduce the distance a farmer must travel to reach his plots. It also reduces the difficulty of providing standard amounts of labour; this may be interpreted as reducing the cost of labour. If it is assumed that the cost of labour increases linearly with distance from the farmstead or village centre then it may be expected that after consolidation land-use intensity would increase, since the optimum input of labour will now decline less rapidly with distance (Chisholm, 1979; Found 1971; Hall 1966). Consideration of such changes in the spatial distribution of land-uses is only possible for the Kissonerga, Khlorakas and Akrounda schemes. In the case of Palechori the project area is 8 kilometres away from the main settlement. This fact, combined with the strange elongated shape of the scheme make any such analysis meaningless. The problem in Phinikaria is that the project area is split into four separate segments making an analysis for the whole scheme impossible.

For the remaining projects changing land-use patterns related to distance were investigated by measuring the percentage composition of land-uses in concentric bands at half-kilometre intervals from the village centre.

Some of the results have been presented graphically in Figures 5.11, 5.12 and 5.13. Only the most significant land changes have been included.

It is evident from an inspection of the graph profiles that after consolidation a spatial rearrangement of land-uses has taken place. In all three schemes much of the cultivated area before consolidation clustered close to the village centres. Here were the most intensively farmed plots of bananas, vegetables and cereals and the smallest area of uncultivated land. Three years after consolidation most of the changing land-use patterns have been spatially concentrated close to the main settlement although there is some evidence of a zonal expansion outwards from the main villages. In the Kissonerga scheme this expansion is best identified by examination of the banana crop which shifted zonally after consolidation and is now cultivated intensively even on the periphery of the project area. At the same time cereal growing, which once occupied a zone from 0.5 km. to the edge of the scheme, has shrunk in extent and is now confined to a small zone 1.0 km. to 2.0 km. from the village centre.

In Khlorakas zonal shifts after consolidation are again in evidence. This time citrus cultivation has replaced vegetable production in an area close to the village centre. Vegetables are now concentrated in an adjacent zone. Significantly, vegetable production is most intensive 5 kilometres from the village centre occupying an area that was barren before consolidation. In contrast, in Akrounda the zonal shifts of land-use types are not as clearly identifiable. Most noticeable here has been the growth of citrus close to the village centre, pushing cereal production to a peripheral location. Once again though, even on the boundary of the project, there is intensive agricultural activity with at least 60% of the zone devoted to citrus.

5.2.3. Land-Use Changes for a Sample of Holders

Land-use changes incorporating the entire area of specific consolidation schemes are mirrored to a certain extent by information provided from

FIGURE 5.11 LAND-USE ZONING BEFORE (1971) AND AFTER (1978, 1981) CONSOLIDATION: KISSONERGA

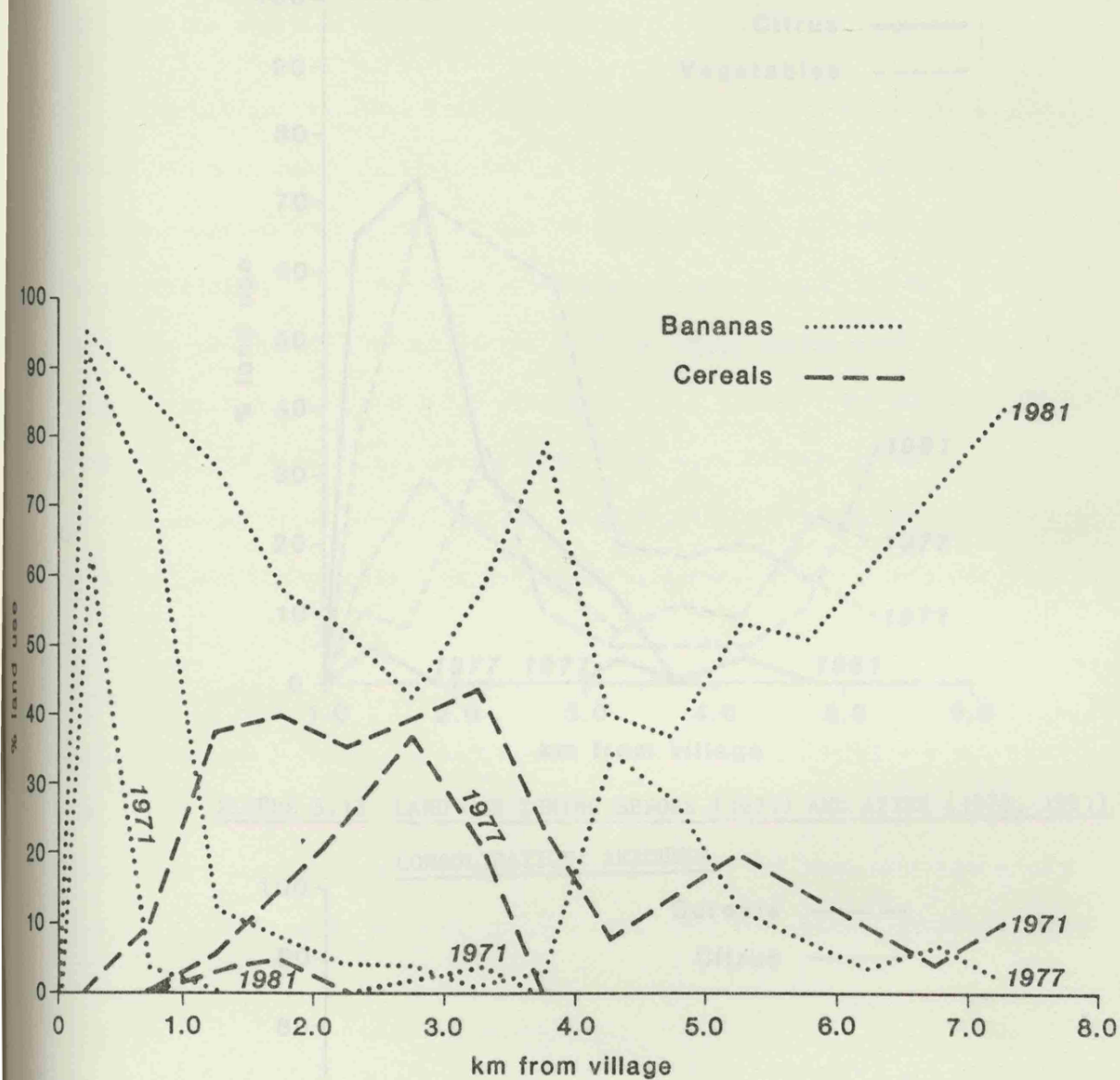


FIGURE 5.12 LAND-USE ZONING BEFORE (1971) AND AFTER (1978, 1981)

CONSOLIDATION: KHLORAKAS

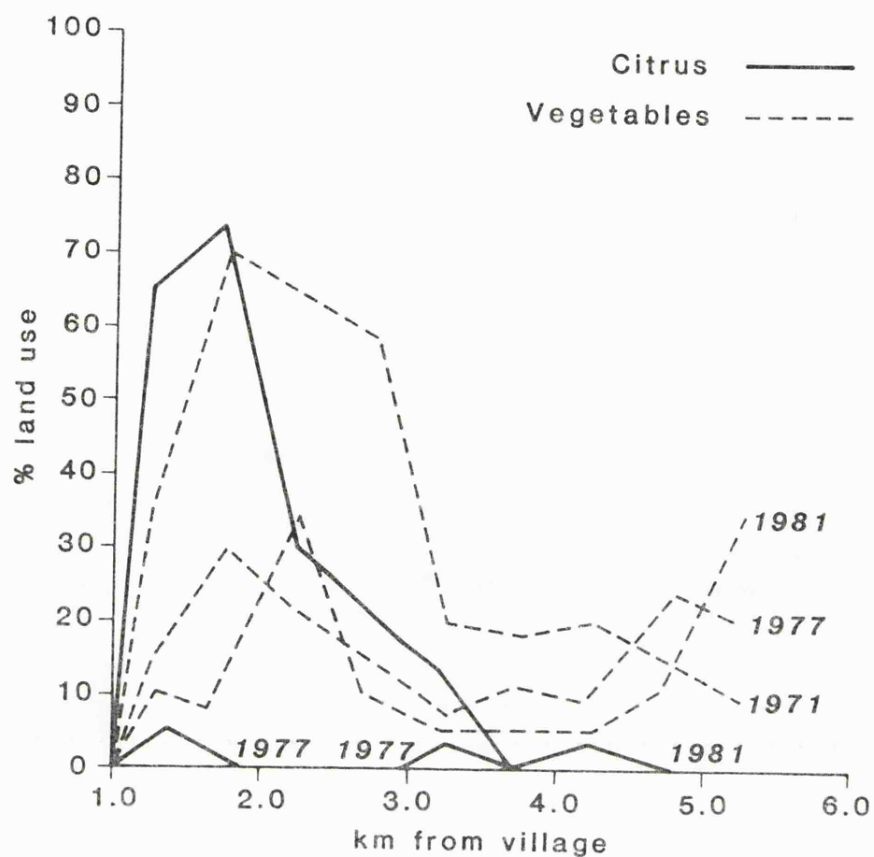
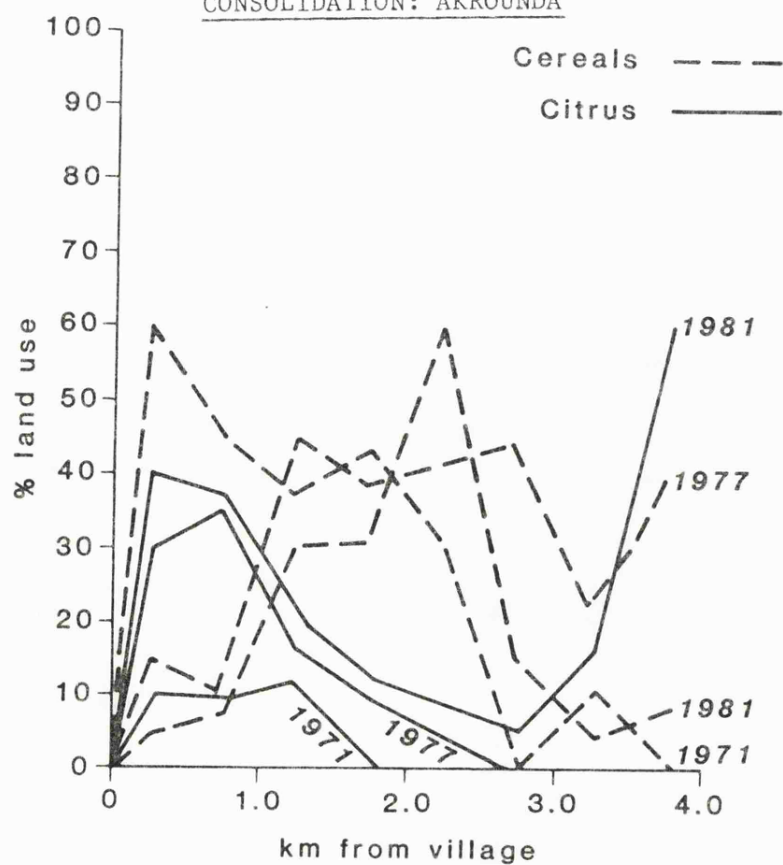


FIGURE 5.13 LAND-USE ZONING BEFORE (1971) AND AFTER (1978, 1981)

CONSOLIDATION: AKROUNDA



the samples of affected holders at general and village levels. Although based on a sample, analysis of these data allow a deeper understanding of the process of change operating in individual schemes and provide a framework for the detailed evaluation of changing land-use.

Changes in the total area left uncultivated before and after consolidation are considered first (Table 5.13). For all schemes two-thirds of holders reported that a part or all of their land was left uncultivated before consolidation. After land consolidation this proportion had fallen to less than one-third. Reduction in the total uncultivated area reflects this response with a fall from 809.6 donums to 327.2 donums. The mean uncultivated unit per holder fell more rapidly from 4.04 donums before consolidation to 1.63 donums after consolidation. However, there are significant differences between the samples from different villages. Most notable was the rapid fall in holders reporting uncultivated land in Palechori and Akrounda/Phinikaria after consolidation. In both cases the mean uncultivated unit fell from over 3 donums to just over 1 donum. In Kissonerga and Khlorakas the situation was rather different with fewer holders reporting uncultivated land before consolidation but with the total area and mean unit being much larger. In Khlorakas the mean uncultivated unit was still high after consolidation.

The area under cultivation and main crops grown before and after consolidation by the sample of holders from First Phase projects is shown in Table 5.14. Cereals were the main land use before consolidation with 55.1% of all operators growing this crop which covered 54.9% of the total operated land. Vegetables, grown by 21.0% of operators, covered 21.2% of the operated area and vines, citrus and bananas, produced by fewer operators, covered much smaller areas. After consolidation the increase in the number of holders operating their land led to a subsequent increase in the cropped area, particularly enterprises devoted to citrus and bananas. These two crops were now grown by more than 20% of all operators and together covered

TABLE 5.13UNCULTIVATED LAND BEFORE AND AFTER CONSOLIDATION FOR TOTAL SAMPLE(n=200)

Village	% Holders Owning Uncultivated Land		Total Area Uncultivated (donums)		Mean Uncultivated Area Per Holding (donums)	
	Before	After	Before	After	Before	After
Palechori (n=50)	70	20	167.10	51.70	3.34	1.03
Kissonerga (n=50)	68	36	193.41	68.20	3.86	1.36
Khlorakas (n=50)	64	40	267.01	150.00	5.35	3.00
Akrounda/ Phinikaria (n=50)	65	24	182.10	57.30	3.64	1.14
Total/Average	66	30	809.62	327.20	4.04	1.63

Source: Author's questionnaire survey

TABLE 5.14

MAIN CROPS CULTIVATED BEFORE AND AFTER CONSOLIDATION FOR TOTAL
SAMPLE OF OPERATORS (n=120)

Crop Type	Before Consolidation		After Consolidation	
	% Operators	Operated Area (donums)	% Operators	Operated Area (donums)
Vegetables	21.0	80.2	33.7	367.9
Vegetables in greenhouses	0.0	0.0	10.3	140.9
Cultivated Trees	12.3	43.1	4.4	47.4
Vines	10.1	39.9	0.5	5.9
Cereals	55.1	206.9	3.3	54.6
Strawberries	0.0	0.0	5.4	52.5
Citrus	0.7	3.1	20.1	240.3
Bananas	0.7	3.6	22.3	304.5

Source: Author's questionnaire survey

44.8% of the cultivated area. The number of operators involved in vegetable production had also risen and this crop covered 33.7% of the operated area with greenhouses appearing on 11.6% of operated plots. Cereals, vines and cultivated trees on the other hand all showed a decline after consolidation.

Comparison with an earlier table (see Table 5.12) indicates a similar trend in land use changes, although direct comparison is not possible because the uncultivated area is not included in Table 5.14. Nevertheless, some differences are immediately apparent, particularly the more rapid decline in cereals and cultivated trees recorded by the sample of holders.

If the changes in the cropped area are examined for individual schemes (Table 5.15) then considerable variations are evident reflecting environmental location, traditional land-uses and possibly variations in response to the consolidation process. For example, in the Palechori scheme the decline in the area under cereals is only small and the increase in vegetables relatively large. Contrastingly, in Akrounda/Phinikaria, Kissonerga and Khlorakas the decline in cereals has been rapid with this particular crop covering a large portion of the operated area before consolidation. In Khlorakas vegetables produced in greenhouses have become the dominant crop after consolidation with citrus an important second. In Kissonerga bananas dominate the post-consolidation landscape while in Akrounda/Phinikaria citrus and vegetables combine to characterize farming operations.

When these changes are broken down by holding size group for each scheme the direction of change can be monitored. Questionnaire results show that in Palechori, for example, the movement towards vegetable production is most strongly represented in the larger holding groups (more than 5 donums), whilst strawberry production is a feature of the smaller ownership classes. Similarly, smaller holding groups characterize banana cultivation in Kissonerga and citrus growing in Khlorakas and Akrounda/Phinikaria.

TABLE 5.15

MAIN CROPS CULTIVATED BEFORE AND AFTER CONSOLIDATION FOR THE
SAMPLE OF HOLDERS, BY VILLAGE

	Before Consolidation		After Consolidation	
	% Operators	Area (donums)	% Operators	Area (donums)
PALECHORI:				
Vegetables	14.1	9.1	70.7	168.8
Cereals	14.5	9.3	0.0	0.0
Cultivated Trees	45.5	29.3	10.4	37.1
Vines	25.9	16.7	0.0	0.0
Strawberries	0.0	0.0	20.7	52.5
KISSONERGA:				
Vegetables	20.4	31.7	4.2	14.6
Greenhouses	0.0	0.0	2.1	7.3
Cereals	70.4	109.4	2.1	7.3
Vines	6.8	10.6	0.0	0.0
Citrus	0.0	0.0	14.9	51.9
Bananas	2.3	3.6	76.7	267.6
KHLORAKAS:				
Vegetables	31.8	23.7	27.6	96.3
Greenhouses	0.0	0.0	38.3	133.6
Cereals	62.2	50.8	8.5	29.7
Cultivated Trees	0.0	0.0	4.3	15.0
Citrus	0.0	0.0	14.9	51.9
Bananas	0.0	0.0	10.6	36.9
AKROUNDA/PHINIKARIA:				
Vegetables	13.1	9.6	34.8	88.8
Cereals	60.8	44.4	6.9	17.6
Cultivated Trees	4.3	3.1	2.3	5.8
Vines	17.4	12.7	2.3	5.9
Citrus	4.3	3.1	53.5	136.5

Source: Author's questionnaire survey

5.2.4. Changes in Livestock Enterprises

Another land-use, although affecting a much smaller area than the products already discussed, is livestock which plays an important role in Mediterranean subsistence and semi-commercialized agriculture, providing raw products for consumption or for sale in local markets. While land consolidation as a process may not directly affect the size of the livestock enterprise, it does provide the necessary conditions (i.e. access roads, water, etc.) for an improvement and enlargement of such operations. Furthermore the re-allocation of plots after consolidation may necessitate the spatial re-location of livestock units, so altering the rural landscape.

Data referring to livestock changes were collected using the questionnaire survey. For the total sample the number of animals more than tripled from 300 before consolidation to 935 after consolidation. Poultry and goats dominated the livestock scene. The number of goats rose from 101 to 264 and chicken numbers increased from 199 to 671. The mean number of goats per holder increased from 0.5 to 1.3 and mean chickens per holder from 0.9 to 3.3. However, not all holders kept livestock. Owners in the smaller holding groups had the largest livestock enterprises. Inter-scheme differences are also evident, with the Palechori sample possessing most of the animal units. This is partly the result of the subsistence nature of the agriculture in this region and partly because of the need to supplement farm incomes because holdings are too small, even after consolidation. The rapid growth of livestock numbers is also associated with the appearance of dispersed farmsteads in the Palechori project area. This phenomenon is dealt with in the next section.

5.3. OTHER CHANGES IN THE RURAL LANDSCAPE

Other changes in the rural landscape have also occurred as a result of the consolidation process. Some of these, like the appearance of new farm roads and irrigation networks, are a feature of all the First Phase schemes. Others are more specific to individual projects; these include such develop-

ments as dispersed farmsteads, tourist intrusions and landscape renovation.

New road building is a major component of the land consolidation process in Cyprus and its effects on the agrarian landscape are important in two ways. Firstly, the newly constructed straight, wide roads, replacing ancient footpaths and winding access tracks, have an immediate visual impact. From an aesthetic view such a change may be displeasing (at least, to an outside observer), and in some consolidation schemes the new roads have been a source of conflict between the L.C.A. and the farmer. Secondly, the farm roads, giving access to every holder's fields, have created a freedom of movement across the agrarian landscape that did not exist before. For the first time some plots have direct access by machines, and travelling time for the farmer to his land and to markets, has been greatly reduced.

Prior to the implementation of land consolidation in the project areas, the total farm road length was 18.86 km., with an average road length per scheme of 3.77 km. After consolidation the total road length had increased substantially to 55.57 km., with an average length per scheme of 11.11 km. The expansion of this network increased the number of holdings with direct road access from 46.54% to 100%. Every field is now served by a rural road compared to the pre-consolidation situation when only 18.6% of plots had access. Cost of road construction, a major item in the total cost of the consolidation process, has been £CY40,538 with an average expenditure per scheme of £CY8,107 and per kilometre of £CY967.

This general picture obscures the fact that in some schemes the road-building programme has been more extensive while in others it has been limited as a result of difficult terrain and high construction costs (Table 5.16). For example, road construction in the mountainous Palechori area was not easy and the average cost per km. of £CY1,100 has made this the most costly of all First Phase projects. Environmental difficulties have also created problems of maintenance and many farm roads are now in a poor state of repair. On the other hand, in lowland Kissonerga and Khlorkas the flat

TABLE 5.16

CHANGES IN THE RURAL ROAD NETWORK AFTER CONSOLIDATION FOR THE PHASE ONE PROJECTS

	PALECHORI		KISSONERGA		KHLORAKAS		AKROUNDA		PHINIKARIA	
	Before	After	Before	After	Before	After	Before	After	Before	After
% Holdings Served by Roads	26.8	100.0	38.7	100.0	56.8	100.0	57.5	100.0	52.9	100.0
% Plots Served by Roads	27.9	100.0	16.5	100.0	27.4	100.0	31.3	100.0	48.9	100.0
Length of Roads (km)	5.3	11.4	3.5	18.5	4.9	12.9	4.4	8.2	0.8	4.6
Total Cost (£CY)	6,823		14,530		7,909		7,412		3,664	
Cost per km (£CY)	1,100		968		988		926		855	
% of Total Cost of Consolidation Schemes	26.6		44.5		33.3		35.5		26.2	

Source: L.C.A., Nicosia

terrain has facilitated road construction and the network has become extensive after consolidation. An example of the 'before and after' situation for Khlorakas is given in Figure 5.14.

Information on the new irrigation systems in the project areas is not at present available. However, some general observations on the basis of local knowledge can be made. The new systems have generally replaced or improved existing conveyors. These improvements have provided a regular water supply and this factor has prompted some further irrigation development. For example, in Palechori, water tanks have appeared on many holdings. These concrete structures provide water storage facilities for irrigation purposes as well as for domestic uses when sited close to farmsteads. From these tanks, as well as from the main feeder channel, traditional methods of irrigation - earth drainage ditches - convey the water to the fields. A similar pattern of ditches is found in Akrounda and Phinikaria although water is relayed by pipeline from a pumping station above the nearby Yermasoyia Dam. In Kissonerga and Khlorakas metal and plastic pipes provide on-farm water; these modern methods of irrigation, along with sprinkler systems, now replace the traditional drainage ditches, although the inter-meshing of pipe systems sometimes creates a confused pattern.

In one consolidation scheme, Palechori, there has been a rapid growth of farmsteads after land consolidation (Figure 5.15). Their appearance is a unique feature of the rural settlement pattern in an island where the rural population has traditionally crowded into congested villages. The development of dispersed farmsteads here, and not in other project areas, can be partly explained by the fact that the village centre is some distance away from the consolidation scheme. This meant that before consolidation intense periods of farming activity necessitated the erection of inadequate temporary shelters on the plots. The changes in holding structure, regulation of the water supply and improvement in holding and plot access have provided the necessary incentive for a shift in location. Farmstead development has been

FIGURE 5.14 ROAD NETWORK BEFORE AND AFTER CONSOLIDATION: KHLORAKAS

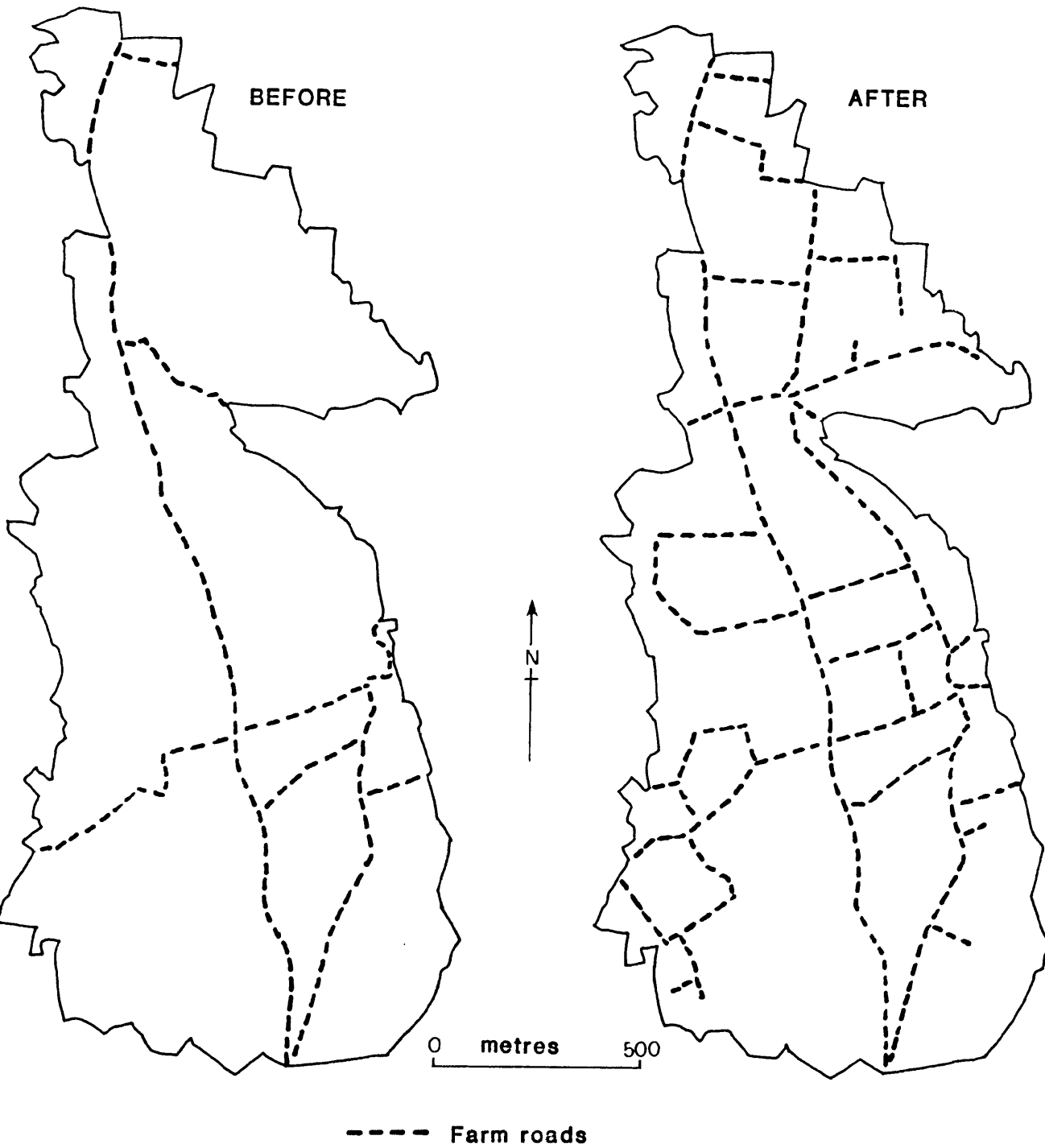
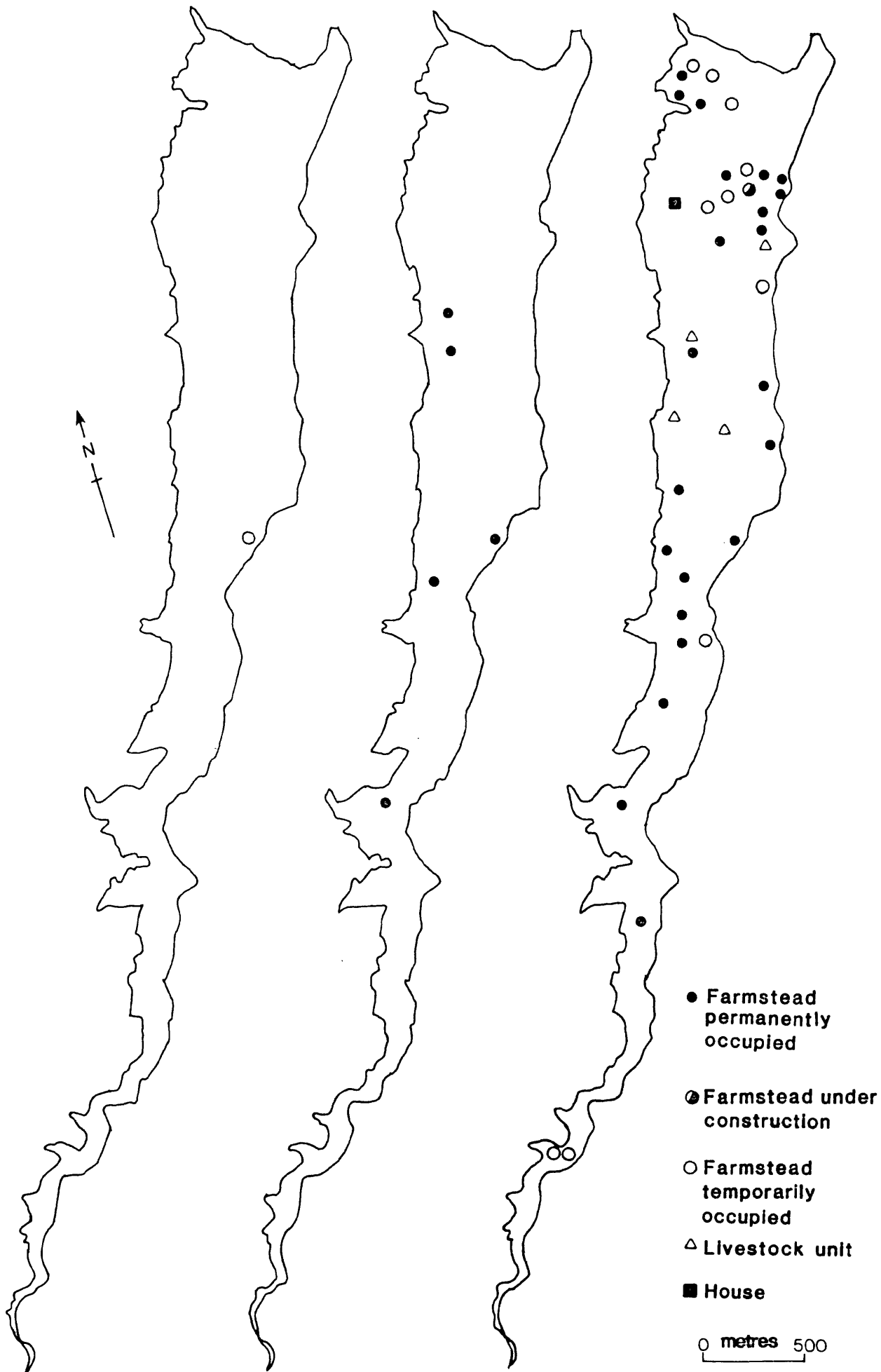


FIGURE 5.15 DISTRIBUTION OF FARMSTEADS: PALECHORI



particularly rapid since 1977 and during the period 1977-81 this type of settlement increased from 5 to 33 (10 of which are occupied on a part-time basis). One farmstead is under construction and a 'villa' has been built on a consolidated plot sold after 1978.

The farmsteads are of varying quality, often reflecting the peasant nature of the holders or in other cases an urban orientation. For example, some buildings are rough, ramshackle affairs while others are elaborate two or three-storey constructions. One holder has added a coffee-shop close to his house and this provides a focus for other farmers living and working in the project area as well as providing some general services. Many of the farmsteaders have built livestock units on to their homes. The transformation of the rural landscape by this development has had further effects. Land close to the farmsteads has usually been improved and demarcated by retaining walls or fences, with access through a metal gateway. In some areas more ambitious farmsteaders have built roadside stalls from which to sell their produce directly to passing customers.

In Kissonerga and Khlorakas the change in the rural fabric, not as dramatic as in Palechori, has come from competing land uses rather than from the direct expansion of rural interests. The designation of tourist zones by the local planning department in Paphos has directly affected the project areas and there is now competition for land between tourism and agriculture, the former usually winning. More consolidated plots are being affected by being designated as suited to tourist development in Kissonerga than in Khlorakas - 25 compared to 5. The Kissonerga project area also contains the first hotel to be built in any consolidation scheme in Cyprus. A further ten applications have been made for hotel building in the area and the Kissonerga consolidation project is likely to be a zone of rapid touristic development in the future.

The impact of this on the consolidation process is immediate. For

example, with the designation of tourist areas has come the need to provide adequate road links with the main town of Paphos. The farm roads built under the aegis of the consolidation policy are considered too small and are currently being replaced by a much wider carriageway. Already some holders have lost small amounts of land paid for by the Cypriot Government. Existing farm roads entering the new routeway are being blocked off because of the danger of farm traffic crossing the road. Movement and access in the project areas are thus being restricted and the original expensive consolidation road building programme ruined. Difficulties for farming also increase close to the new road, particularly problems of damage and trespass from passing holidaymakers. In some cases the large amounts of money being offered for land by potential developers have persuaded some farmers to sell their holdings while others have temporarily abandoned them waiting for land prices to increase further.

Finally, in all consolidation schemes limited attempts at landscape renovation have been made. Often these are difficult to spot for they have usually taken the form of a few trees and bushes planted along the new roads or in small plots left for this purpose. The aim of the L.C.A. in this respect was to inspire owners to plant additional trees and bushes. However, the attempt to create a 'landscape awareness' by such examples has generally failed and in many cases this vegetation has been allowed to die. ■

CHAPTER SIX

BEHAVIOURAL, ECONOMIC AND SOCIAL EFFECTS OF CONSOLIDATION

This chapter considers in detail the information obtained from the questionnaire survey. First a general description of the sample of holders is given. Next the perceived image of consolidation, the learning process and values of land ownership are explored; then significant economic changes resulting from consolidation are presented, comparing the 'before' and 'after' situations. Following this, the importance of consolidation as a process affecting social change is evaluated. In each section the analysis concentrates first on the total sample, often broken down by holding size classes, and then moves on to consider variations between the First Phase projects. At this stage, inter-village variations are not explained in detail; this is attempted in the next chapter (see Section 7.1 on 'Discussion of Results'). Finally, the inter-relationships between variables are studied and tested for significance.

6.1. PROFILE OF RESPONDENTS

This section examines some general characteristics of the total sample of holders. Topics covered include age, stage-in-the-life-cycle, education, location and principal occupation.

Owners were found to be characterized by a negatively skewed age structure (Figure 6.1). The largest group of holders (39.5%) fell within the 50-60 year group while more than 20% were more than 60 years old. Very young owners were rare; only 3% of the sample were aged below 30 years. The mean age of holders was 48.5 years. However, significant differences exist between the sample villages. In Palechori, for example, the mean age was 53.3 years with 64% above 60 years of age and only 24% below 40 years. On the other hand, in Kissonerga 52% of owners were less than 50 years of age, and the mean age per holder was 42 years. Holders were slightly older in Khlorakas with a mean of 49.2 years and 52% of owners within the 30-50 age groups. Like the Palechori sample, owners in Akrounda/Phinikaria were generally older. Here more than 60% of holders were above 60 years of age and the mean age was 52.4 years.

Stage-in-the-life-cycle and family size naturally reflect the age composition of holders. For the total sample 96% of holders were married with 98% of these owners having children. Mean family size was 3.2 children. Again, inter-village variations were evident. The mean family size for Palechori respondents was 5.02 children. In this village the mean age of each child was 23 years. Contrastingly in Kissonerga and Khlorakas mean family sizes were lower, with 3.0 and 3.2 children respectively. Average age of offspring in Kissonerga was 12 years and in Khlorakas 12.3 years. For the Akrounda/Phinikaria sample mean family size was 4.2 offspring and the mean age of children was 21.4 years.

Education levels for the total sample were not high (Figure 6.2). Most holders had finished their education between the ages of 10 and 12 years. Only 35% had continued full-time study after the age of 12 with the majority of these completing their education at the age of 16, although 3% of owners (mostly urban-based part-time farmers) went onto study abroad. The situation in the sample villages differs little from this overall pattern except for the Kissonerga sample where 42% of holders had remained at school

FIGURE 6.1 AGE-STRUCTURE OF SAMPLE

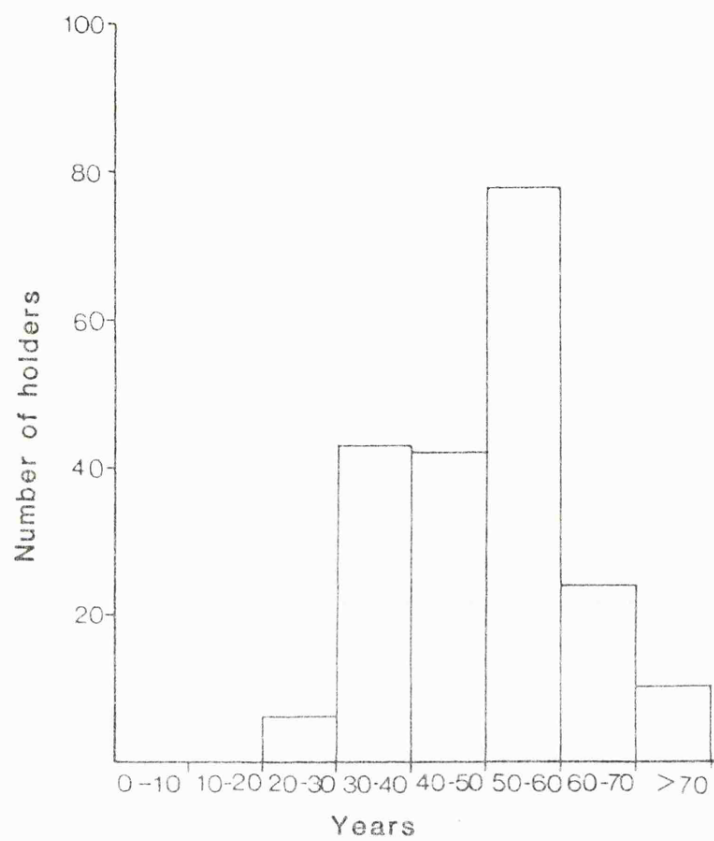
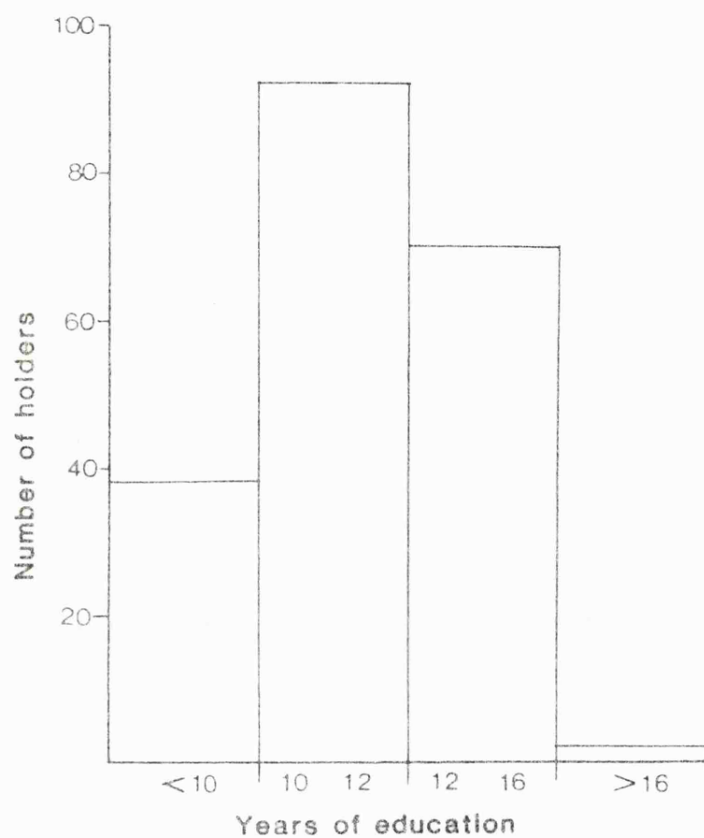


FIGURE 6.2 EDUCATION LEVELS OF SAMPLE



until the age of 12.

Most holders resided in one of three places: more than 80% of the total sample lived in their respective villages; 11.5% lived in the nearest major town; and 8% were located in dispersed farmsteads. When location of residence was broken down by holding size (Table 6.1) it was found that urban locations were a feature of the smaller ownership classes, whilst residence in dispersed farmsteads was characteristic of the larger holding groups, particularly the 5-10 and over 20 donum classes.

Variations in the location of respondents between the schemes was also evident. In the Palechori sample 62% of holders lived in the village, while 24% had re-located to farmsteads and 14% lived in Nicosia. In the remaining samples no movement to dispersed settlement had taken place. However in the Kissonerga and Khlorakas schemes village location dominated with more than 50% of holders living in their villages. Contrastingly in the Akrounda/Phinikaria sample more than 30% of holders were located in nearby Limassol.

Respondents were predominantly males; only 36% of holders were female. In most cases where land was operated by the holder, both husband and wife worked the holding, often supplemented by other family help and occasionally by hired labour. Only 6% of holders failed to operate their land. Overall 48.5% worked their holding on a full-time basis and 45.5% on a part-time basis. The main off-farm occupations included government employment, small businesses such as coffee-shops and labouring in the construction industry.

6.2. BEHAVIOURAL CONSIDERATIONS

The mediation of the behavioural environment links the land consolidation process with any subsequent changes in economic or social conditions. In this section the results of an investigation into holders' perceived images of consolidation using Likert Scales is presented. Also included is information on the way that this image is structured through the use of a variety

TABLE 6.1LOCATION OF RESIDENCE FOR TOTAL SAMPLE OF HOLDERS

Holding Size Groups (donums)	% of Holders Living In:		
	Town	Village	Farmstead
1 - 2	40.0	60.0	0.0
2 - 5	20.2	75.0	5.9
5 - 10	5.8	81.0	13.0
10 - 20	0.0	96.8	3.2
Over 20	0.0	87.5	12.5

Source: Author's questionnaire survey

of information sources and by consideration of the underlying goals and values of respondents.

6.2.1. The Perceived Image of Land Consolidation

For the total sample of holders a factor analysis of Likert scores revealed that six factors were significant in the perceived image, explaining 69.7% of the variance (Table 6.2.). The cut-off point utilises Kaiser's eigenvalue method noted earlier. The large number of significant factors demonstrates the complexity of the image structure. Factors were rotated using the varimax method, an option available on S.P.S.S. The loadings of Likert scales on these factors are given in Table 6.3. Only those scales with a loading of more than 0.4 were considered significant and these were used to describe each relevant factor.

For the most part it would appear that the consolidation process has been favourably perceived. The first three factors, accounting for 50.2% of the explained variance, pick out a large group of holders with a positive image of the consolidation process. Factor 1 identifies the new farm roads, new plot sizes and plot concentration as the significant variables. These elements are perceived to have allowed greater market access, an increase in the cropped area and less difficult irrigation. The next factor, explaining slightly less of the variance, picks out a smaller group of holders who felt that the distance-reducing effects of the consolidation process are most notable. Plot concentration was thought to have allowed more time to be spent farming and an increase in crop specialization. Also important in this factor were the new irrigation facilities which have resulted in the changes in land-use described in the previous chapter. In Factor 3 the new plot shape is stressed with the geometrical structure of fields allowing improved land-use. New farm roads are also significant, providing greater access to plots rather than to markets, while increases in plot size have led to improved land productivity.

The next three factors pick out small groups of holders who are

TABLE 6.2

EIGENVALUES AND COMPONENT LOADINGS ASSOCIATED WITH PERCEIVED IMAGE
OF CONSOLIDATION

Factors	Eigenvalues	% Variance	Cumulative %
1	4.251	23.6	23.6
2	3.095	17.2	40.8
3	1.696	9.4	50.2
4	1.376	7.6	57.9
5	1.128	6.3	64.1
6	1.007	5.6	69.7

7	.961	5.3	75.1
8	.783	4.3	79.4
9	.622	3.5	82.9
10	.508	2.8	85.7
11	.478	2.7	88.4
12	.428	2.4	90.7
13	.400	2.2	93.0
14	.394	2.2	95.1
15	.296	1.6	96.8
16	.226	1.3	98.0
17	.210	1.2	99.2
18	.143	.8	100.0

Source: Based on data from author's questionnaire survey

TABLE 6.3

VARIMAX ROTATED FACTOR MATRIX AFTER ROTATION WITH KAISER
NORMALIZATION

Likert Scale Variables	FACTORS					
	1	2	3	4	5	6
1	.186	.471	.310	.227	-.134	.229
2	-.008	-.002	-.337	.101	-.004	.446
3	.116	.910	.032	.048	-.024	.076
4	-.115	.163	.141	.008	.217	.277
5	.108	.176	.016	.791	-.089	.075
6	.105	.328	.411	-.143	-.007	-.137
7	.141	.166	.021	-.414	.210	.550
8	-.354	.274	.304	.228	.172	-.316
9	.775	.137	-.003	-.081	.199	.060
10	.085	.142	.679	-.008	-.015	.097
11	-.297	.369	.496	.320	-.422	-.083
12	.376	-.008	.041	-.179	.891	.181
13	-.127	.211	.566	.389	-.177	-.001
14	-.105	-.016	.327	-.012	.126	-.039
15	.796	.109	-.012	.284	-.018	-.175
16	-.443	.295	.455	.337	-.296	.041
17	.613	.028	-.116	-.090	.234	.483
18	-.009	.686	.215	.136	.067	.034

Note: For the exact specification of the 18 Likert scale statements see the final section of the Questionnaire in Appendix B.

Source: Based on data from author's questionnaire survey

dissatisfied with the consolidation process. These negative factors account in total for 19.1% of the remaining explained variance. The first of these, Factor 4, identifies those holders concerned with the poor construction of the new farm roads. Factor 5 is characterized by holders pointing out the poor shape of new plots and feeling that shape changes have not improved effective land-use. Finally, in Factor 6 the critical image of consolidation revolves around the central aspect of plot concentration, which is perceived to have led to a fall in land productivity. Also important in Factor 6 is the failure of the new farm roads to resolve conflicts over access and rights of way.

The complexity of the image structure for the total sample of respondents reflects in part the different environmental locations of each project as well as the particular consolidation experience of specific schemes. Consideration of the perceived images from holders from each sample village thus reveals considerable variation from the general picture just described.

In the case of the Palechori sample, the perceived image of consolidation was relatively simple and extremely positive (Table 6.4). Factor 1 picks out a major group of holders who view with favour the changes consolidation has brought. Key elements are plot concentration; increases in plot size and the provision of irrigation facilities. These developments are perceived to have allowed increases in land productivity, crop specialization and more time to be spent farming. A much smaller group of holders, unhappy with land consolidation, is identified by Factor 2. This group emphasizes the negative effect of consolidation and is concerned particularly with problems over plot sizes, irrigation and the new road network. Factors 3,4 and 5 identify groups of holders whose significant elements are roads, plot shape and plot concentration.

By contrast, in Khlorakas the image of consolidation is both much more complex and generally rather more negative. Due to difficulties of interpretation only four factors, explaining 67.3% of the variance, are considered

TABLE 6.4

THE PERCEIVED IMAGE OF LAND CONSOLIDATION: PALECHORI SAMPLE

Factor	Explained Variance (%)	Image Variables
1	68.7	Plot concentration: more time farming Plot concentration: crop specialization Plot concentration: easier irrigation New plot size: increase in cropped area New plot size: improved land productivity New plot size: change in land-use Irrigation facilities: new crops
2	11.8	New plot size: still too small New farm roads: unresolved access conflicts Irrigation facilities: still problematic
3	8.8	New farm roads: greater access to fields
4	6.6	New plot shape: more geometrical
5	4.2	Plot concentration: reduced farm costs
Total	89.9	

Source: Author's questionnaire survey

TABLE 6.5THE PERCEIVED IMAGE OF LAND CONSOLIDATION: KHLORAKAS SAMPLE

Factor	Explained Variance (%)	Image Variables
1	33.9	New farm roads: greater market access New plot size: crop specialization New plot shape: poor arrangement New farm roads: unresolved access conflicts Irrigation facilities: still problematic
2	13.0	Plot concentration: crop specialization Plot concentration: less difficult irrigation
3	11.0	New plot shape: more geometrical New plot size: improved land productivity
4	9.4	Plot concentration: reduced land productivity New farm roads: not increased time spent farming
Total	67.3	

Source: Author's questionnaire survey

in this analysis (Table 6.5). Factor 1 picks out a large group of holders somewhat unhappy with certain aspects of land consolidation. Problem areas include: conflicts over access and rights of way that have not been resolved by the new road network; plot shapes which are still too irregular, making the use of machinery difficult; and difficulties over irrigation. Positive aspects for this group are the new roads, although the emphasis in this project (compared to Palechori) is on access to markets rather than to fields. Also important are the increases in plot sizes which have stimulated land-use changes.

A smaller group of Khlorakas holders, favourably inclined to the consolidation process, is identified by Factor 2. Here plot concentration, with its distance-reducing effects, together with the new irrigation facilities, are perceived to have stimulated a movement towards crop specialization. Similarly Factor 3 picks out a small group of holders with a positive image although the significant elements are changes in plot structure and increases in their size. These are perceived to have allowed increases in land productivity. Finally, Factor 4 is characterized by a further group of dissatisfied holders arguing that plot concentration has reduced land productivity and that the new road network has not led to increased farming activity.

For the Kissonerga sample (Table 6.6) the perceived image of consolidation retains its complexity with six factors being significant, their structure generally reflecting a much more favourable view of the consolidation process. The largest group of holders, represented by Factor 1, emphasize the spatial changes in plot size and shape together with the importance of the new road network. These are perceived to have allowed improvements in land-use, increases in the cropped area and greater market access. However the new irrigation facilities are noted as problematical by this group.

Factor 2, representing a much smaller group, again emphasizes the

TABLE 6.6THE PERCEIVED IMAGE OF LAND CONSOLIDATION: KISSONERGA SAMPLE

Factor	Explained Variance (%)	Image Variables
1	31.1	New farm roads: greater market access New plot size: increase in cropped area New plot shape: improved land use Irrigation facilities: still problematical
2	14.9	New farm roads: more time farming New plot size: improved land productivity Irrigation facilities: new crops
3	12.4	Plot concentration: fall in land productivity New farm roads: reduced access New plot shape: reduced effective land use
4	11.4	New farm roads: poorly constructed
5	7.4	Plot concentration: more time spent farming Plot concentration: crop specialization
6	5.6	New farm roads: unresolved access conflicts New plot shape: poor arrangement
Total	82.8	

Source: Author's questionnaire survey

significance of changes in plot size and the appearance of new roads and irrigation facilities. In this factor, these are perceived to have increased farming activity and led to changes in land-use and productivity. Factors 3, 4 and 6 pick out groups of holders dissatisfied with the consolidation process in Kissonerga. Problems with the new farm roads dominate these negative perceptions. Plot concentration is also criticised as having led to a perceived fall in land productivity. Constrastingly, Factor 5 identifies a small group of holders with a positive image related to the distance-reducing effects of consolidation, allowing both more time to be spent farming and increased crop specialization.

The structure of the perceived image for the Akrounda/Phinikaria sample is the most simple, with the majority of holders perceiving the positive aspects of the consolidation process (Table 6.7). The largest group of holders, picked out by Factor 1, identify the distance-reducing effects of consolidation, through spatial concentration, as the most significant. These are perceived to have led to improved irrigation and to crop specialization. Also important for this group are changes in plot size which have resulted in increased land productivity. Alternatively Factor 2 is characterized by a smaller group of dissatisfied holders. The main areas of discontent concern the poor shape of new plots, their small size and the continuing problem of conflicts over access, unresolved by the new road network. Contrastingly, Factors 3 and 4 pick out much smaller groups which are favourably inclined towards consolidation and emphasize the positive aspects of changes in plot shape and the new irrigation and road facilities.

To conclude this section, it must be stressed that perception is not a static phenomenon. It is clear that the perceived image has undergone some modification after the implementation of consolidation. Evidence for this comes from an investigation of holders' voting patterns before consolidation and comparison with their present attitudes towards the process. For the total sample, 80% of respondents had voted 'for' consolidation. The strongest reaction against consolidation was recorded for the Khlorakas

TABLE 6.7

THE PERCEIVED IMAGE OF LAND CONSOLIDATION: AKROUNDA/
PHINIKARIA SAMPLE

Factor	Explained Variance (%)	Image Variables
1	51.3	Plot concentration: crop specialization Plot concentration: easier irrigation New plot size: improved land productivity
2	15.1	New farm roads: unresolved access conflicts New plot size: still too small New plot shape: poor arrangement
3	8.2	New farm roads: greater plot access New plot shape: improved land use
4	6.4	Irrigation facilities: new crops
Total	82.9	

Source: Author's questionnaire survey

sample where 42% of holders had initially opposed the scheme. In other projects the negative vote was much lower: 12% in Kissonerga and Akrounda/Phinikaria and 14% in Palechori. Present-day attitudes towards consolidation reveal a slight change of view with 88% of holders now in favour. As expected, most dissenters again come from the Khlorakas scheme, although the level of disagreement has fallen substantially.

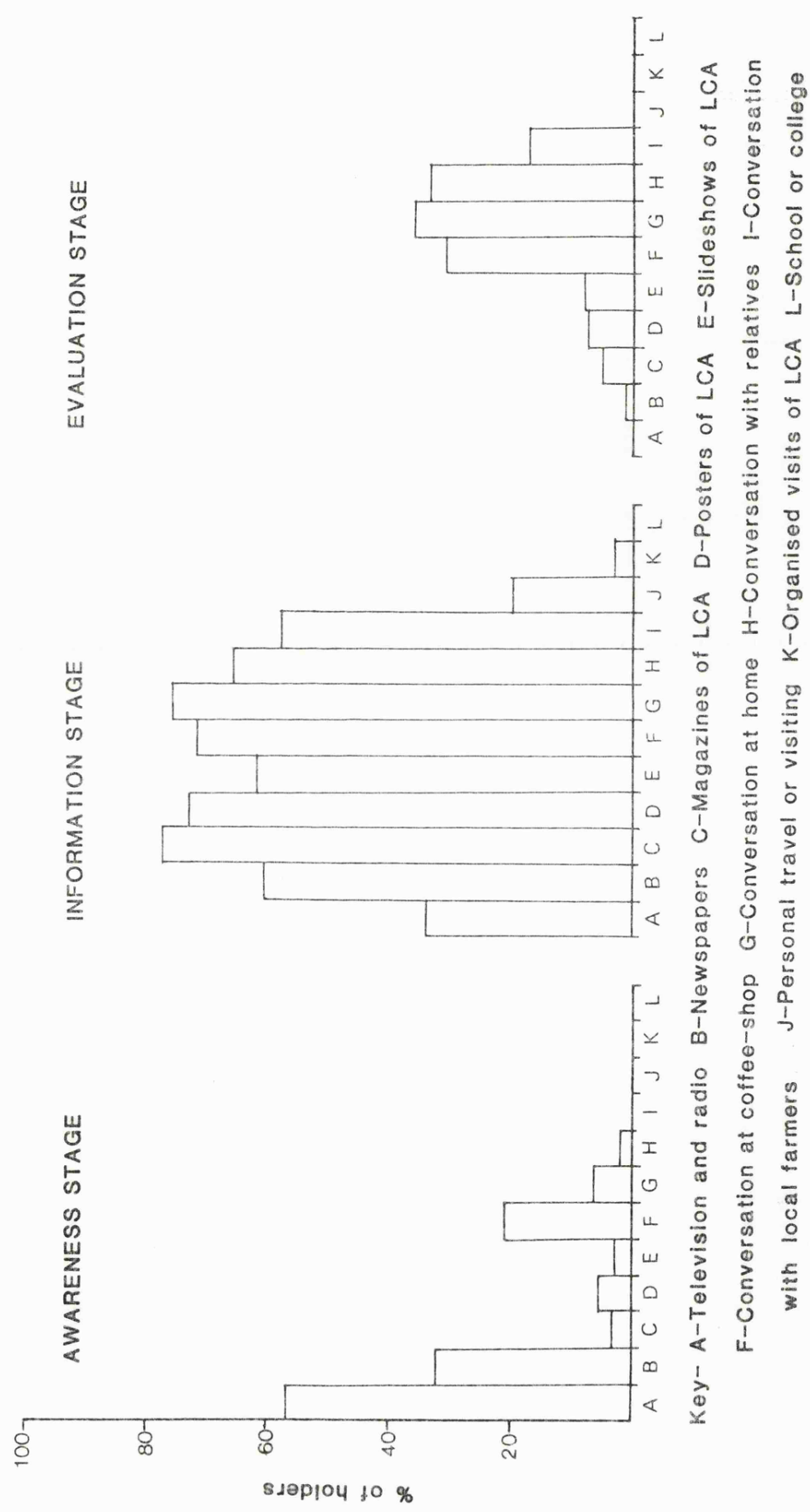
6.2.2. The Use of Information Flows

Any image is partly determined by access to and use of information sources. Different sources are utilized during different 'information stages'. In this section data relating to information flows at three stages are presented and the specific contribution of the L.C.A.'s various sources noted.

The high use of information sources by the total sample of holders reflects their strong interest in the land consolidation process. Figure 6.3. displays histograms of the percentages of holders using twelve sources of three stages of the learning process. Particularly significant is the search procedure adopted by the majority of respondents during the 'information stage'. Here eight of the twelve sources were used by more than 60% of the holders. Sources external to the agricultural society, including the mass media and L.C.A. activities, accounted for rather less than those flows emanating from within the agricultural society. Most significant of these internal flows were the coffee-shop and the home; more than 70% of respondents used these sources. Least important at this stage were personal visiting, organized visits of the L.C.A. and the influence of school or college. Those holders who did utilise information from organized visits had been specifically selected by the L.C.A. as prominent representatives of the rural community and as a result the effect of this information flow may have had wider implications, especially through information exchange in the coffee-shop or with family or friends.

The 'awareness stage' is dominated by the flows of information from

FIGURE 6.3 USE OF INFORMATION FLOWS DURING THE LEARNING PROCESS OF CONSOLIDATION



the mass media, particularly television and radio. This reflects a long and consistent debate by the press and other organizations over the introduction of the consolidation programme and more specifically the passage of the new law in 1969. More than 50% of holders used these flows although a few holders first heard about the concept from other sources. For example, more than 20% relied upon the coffee-shop, a traditional forum for information exchange, while a much smaller percentage had not heard about the process until the beginning of the L.C.A.'s 'enlightenment' programme.

During the 'evaluation stage', when a decision to either accept or reject the process was made, information sources within the agricultural society predominate (Figure 6.3). Also notable is the relative fall in flow utilization compared to the much higher usage during the information stage. The majority of holders relied upon conversations at home and with relatives to evaluate the consolidation concept. The coffee-shop was also important at this stage while the effects of the mass-media or other L.C.A. activities were minimal.

Evaluation of the L.C.A.'s enlightenment efforts in the fields of magazines, posters and slideshows (C, D and E in Figure 6.3) show that these information sources are most significant in the second stage and play relatively small roles in either the awareness or the evaluation stages. Most important of the L.C.A.'s activities are the types of information provided by magazines, pamphlets and propaganda posters such as that shown in Figure 2.1. Most of these were used by more than 70% of holders. Rather less significant were the slideshows with just over 60% of holders attending these.

The consideration of information flows utilized by the samples of holders from different project areas reveals some slight differences from the general picture described above. For example, in the Palechori sample mass media continue to play an important role in the information stage; the activities of the L.C.A. have lower utilization levels with around 40% of

holders using these sources, least significant being the effect of pamphlets and magazines and most important slide shows. Sources within the agricultural society provided the greatest flow of information with more than 80% of Palechori holders relying on contact with local farmers.

Contrastingly in both the Kissonerga and Khlorakas samples the information stage is dominated by the sources provided by the L.C.A. Here the enlightenment programme has been more widely used, often by more than 70% of holders. Also important at this stage is the coffee-shop with more than 80% of Kissonerga's holders obtaining information from this source. In Khlorakas conversation with the family has an important role. In the evaluation stage, too, inter and intra-family contact provide the major information source.

For the Akrounda/Phinikaria sample the picture of information flow utilization is again a little different. The most notable variations are in the first two stages. In the awareness stage it is the coffee-shop which plays a significant role in introducing the consolidation concept rather than the mass media sources reported in the other project areas. Similarly, the coffee-shop continues to play a prominent role during the information stage, closely followed by inter and intra-family contact. In this stage the significance of L.C.A. sources is minimal. Finally, in the evaluation stage, contact with relatives and local farmers provides the main information sources.

6.2.3. Attitudes to Land Ownership

Attitudes to land ownership, recorded by the point-score technique, measure the importance of owning land for the Cypriot holder. These attitudes and their underlying values provide a regulatory and controlling mechanism on reactions to processes like consolidation affecting this resource.

The total scores for each factor for the entire sample, ranked in

TABLE 6.8ATTITUDES TO LAND OWNERSHIP: TOTAL SAMPLE

Factor Rank	Total Score	%A	%T	%I
1 Making a satisfactory income	777	93.5	77.7	83.1
2 Pride of ownership	764	92.0	76.4	83.0
3 Contentment	700	88.5	70.0	79.0
4 Dowry	690	81.5	69.0	84.6
5 Family tradition	658	90.5	65.8	72.7
6 Investment for future	639	79.5	63.9	80.4
7 Enjoyment of farm work	615	86.0	61.5	71.5
8 Recognition and prestige	605	77.5	60.5	78.1
9 Chance to do work without supervision	582	79.5	58.2	73.2
10 Making as much money as possible	551	71.5	55.1	77.1

Note: %A = Percentage Applicability; %T = Total Percentage Score;
 %I = Percentage Importance

Source: Author's questionnaire survey

order of magnitude, are given in Table 6.8. Note that the percentage applicability of all factors used in the attitude scales is high – more than 70%. The most important factor – 'making a satisfactory income' – is of an economic nature. Under a Gasson terminology this would characterise an instrumental value orientation. The remaining six factors are non-economic. The first group includes the land-holding factors of 'feelings of pride of ownership' and 'contentment'. These indicate, again following Gasson (1973), underlying expressive values. Next come a group of factors that have a social orientation expressing the significance of 'family tradition' and 'providing a dowry' for children. Least important on the ranked scale are intrinsic values represented by the ownership factors of 'enjoyment of farm work' and 'the chance to do work without supervision'.

A factor analysis of point scores breaks down the total sample into a number of attitudinal groups. Three such groups, or components, are significant, together explaining 66.6% of the total variance. Kaiser's eigenvalue method was again employed to decide on the cut-off point. Only those rotated components with loadings of more than 0.6 were considered significant. Component I, containing 33.3% of the variance, picked out a large group of holders whose land ownership attitudes contained underlying social, expressive and intrinsic values. Significant attitudinal factors included: recognition and prestige, following the family tradition, feelings of pride of ownership and contentment and enjoyment of farm work. Component II, with 19.4% of the variance, identified a group of holders whose attitudes expressed a mixture of instrumental and social value orientations. The most significant factor here was making a satisfactory income from the land and providing a dowry for the children. Finally, Component III picked out a slightly smaller group with an increment of 13.6% of the explained variance, characterized by economic or instrumental values. Important here were holding land as an investment for the future and for making as much money as possible.

TABLE 6.9

ATTITUDES TO LAND OWNERSHIP: VILLAGE SAMPLES

Factor	Palechori (n = 50)					Kissonerga (n = 50)				
	Rank	Score	%A	%T	%I	Rank	Score	%A	%T	%I
Making as much money as you can	9	53	56.0	26.5	47.3	9	85	66.0	42.5	64.4
Making a satisfactory income	6	118	84.0	59.0	70.2	2	170	96.0	85.0	88.5
As investment for the future	8	61	50.0	30.5	61.0	3	130	86.0	65.0	75.6
Enjoyment of farm work	5	160	90.0	80.0	88.8	8	90	80.0	45.0	56.2
Chance to work without supervision	7	67	52.0	33.5	64.4	7	114	84.0	57.0	67.8
Pride of ownership	3	173	96.0	86.5	90.1	4	141	86.0	70.5	81.9
Contentment	2	180	94.0	90.0	95.7	5	124	80.0	62.0	77.5
Following the family tradition	4	166	90.0	83.0	92.2	6	121	86.0	35.0	62.5
Recognition and prestige	1	180	98.0	90.0	91.8	10	70	56.0	35.0	62.5
Dowry	10	50	38.0	25.0	65.1	1	174	98.0	87.0	88.7

Factor	Khlorakas (n = 50)					Akrounda/Phinikaria (n = 50)				
	Rank	Score	%A	%T	%I	Rank	Score	%A	%T	%I
Making as much money as you can	2	120	94.0	60.0	85.1	9	54	47.0	34.0	47.2
Making a satisfactory income	3	119	98.0	59.5	60.7	6	104	63.0	52.0	70.3
As investment for the future	4	118	96.0	59.0	61.4	5	158	84.0	71.0	87.8
Enjoyment of farm work	10	75	44.0	37.5	39.8	4	166	80.0	74.0	94.0
Chance to work without supervision	6	95	98.0	47.5	48.5	10	49	35.0	26.0	57.3
Pride of ownership	5	109	100.0	54.5	54.5	8	62	49.0	31.0	61.0
Contentment	7	92	100.0	46.0	46.0	7	68	50.0	49.0	57.2
Following the family tradition	8	90	100.0	45.0	45.0	2	176	92.0	90.0	93.1
Recognition and prestige	9	88	100.0	44.0	44.0	1	178	96.0	90.0	92.1
Dowry	1	132	94.0	66.0	68.7	3	173	89.0	85.4	90.1

Note: %A = Percentage Applicability
 %T = Total Percentage Score
 %I = Percentage Importance

Source: Author's questionnaire survey

When samples of owners from the different projects are considered separately some notable differences in value orientation are evident (Table 6.9).

In the Palechori sample, for example, the ranking of point scores shows that the most important factors in land ownership are of a non-economic nature. These include feelings of pride of ownership and contentment and following the family tradition. Together they represent a complex interplay of underlying social and expressive values. Next comes a group of attitudinal factors exhibiting intrinsic and instrumental value orientations but all with a much lower percentage applicability and percentage importance. Significantly, land ownership as a means of providing a dowry for offspring is not applicable to the Palechori sample as a whole, although it may still be important for some individual holders.

In Kissonerga nearly all land ownership factors are significant with more than 80% applicability, while all factors except for 'enjoyment of farm work' have more than 60% importance. Here, by contrast, the dowry dominates the factor list, closely followed by factors of a more economic nature. These include making a satisfactory income and investment for the future.

For the Khlorakas sample the ranked point-score data have again a much higher percentage applicability than they did in Palechori. As for Kissonerga the most significant factor is, again, the dowry although - in terms of percentage importance - this is clearly exceeded by the first of a series of instrumental values clustered together. These land ownership factor attitudes are of an economic nature and include: making as much money as possible, making a satisfactory income and land as an investment for the future. Next comes a mixture of intrinsic and expressive values and finally the last three factors all have underlying social value characteristics.

When the point-score ranks are analysed for the Akrounda/Phinikaria sample the dominance of non-economic factors is clearly visible. Percentage

applicability is not as high as in other samples with only six out of the ten factors having more than 60%. The three most important land ownership factors - recognition and prestige, following the family tradition and dowry - are indicative of underlying social values. Next comes a cluster of instrumental values followed by a mixture of expressive and intrinsic values. The last of these - 'chance to do work without supervision' - has a low percentage applicability, although a relatively high percentage importance.

Factor analysis of point-scores for the individual villages produced three significant factors in each case, with a level of explained variance generally higher than that for the total sample, indicating the significance of the small-group view. In Palechori, Component I, with 31.5% of the variance, identifies a large group of holders with expressive and social value orientations. Most important attitudinal factors are feelings of pride in ownership and contentment; recognition and prestige and following the family tradition. Component II, explaining 14.5% of the variance, picks out a smaller group of holders where instrumental values dominate. Land ownership factors here include holding land as an investment and for providing a satisfactory income. Lastly, Component III, containing 13.2% of the variance, characterizes a group of owners with intrinsic values towards land, the significant factor in this case being the chance to do work without supervision.

Alternatively, in Kissonerga the first component, with 40.5% of the variance, contains a large group of holders with a mixture of both expressive and intrinsic values towards land ownership. Most significant factor attitudes are feelings of pride of ownership and contentment and the ability to work without supervision. Component II picks out a smaller group, with 17.6% of the variance, whose underlying value orientations are of a social and instrumental nature, including the land ownership factors of family tradition and dowry for children. Finally, Component III, with just 15.0% of the variance, identifies a group of holders with basic instrumental

land ownership values. Most important factors are making a satisfactory income and an investment for the future.

Similarly in Khlorakas, Component I, with 38.6% of the variance, picks out a large group of holders with underlying intrinsic and expressive values of land ownership. Particularly important are attitudinal factors of feelings of pride of ownership and contentment and the enjoyment of farm work. A smaller group of holders, explaining 20.1% of the variance, is identified by Component II. This component is characterized by a mixture of social and instrumental values, reflecting the attitudinal factors of recognition and prestige and investment for the future. Component III, with 11.4% of the variance, identifies a group with social value orientations to land ownership, particularly for the dowry.

For the Akrounda/Phinikaria sample, Component I identifies a large group of holders (41.5% of explained variance) with underlying social value orientations towards land ownership through attitudes towards the dowry, tradition etc. Component II picks out a smaller group with 20.1% of the variance, characterized by instrumental value orientations. Most important in this group was 'making a satisfactory income'. Lastly, Component III identifies a group of holders, accounting for 17.4% of the variance, with intrinsic land ownership values. Most notable of these was the factor attitude of enjoyment of farm work.

6.3. ECONOMIC CHANGES

The strong positive image of the land consolidation process and the significant use of various information flows during the evaluation stage indicate consolidation's importance to those Cypriot holders affected by the policy. When this is combined with the instrumental bond between holder and land it may be hypothesized that the consolidation process has created important changes in the economic fabric of the communities affected. Here, therefore, I turn to the effects of land consolidation on a number of

economic variables originally specified in Chapter 2 (see especially Table 2.4). These include: savings in time spent travelling to dispersed plots, changes in labour input, changes in farm inputs and outputs, changes in the level of indebtedness and changes in non-land resources such as farming machinery.

6.3.1. Savings in Travelling Time

A fundamental result of the distance-reducing aspect of land consolidation is to increase the amount of time that can potentially be spent farming. For the total sample the average saving in travelling time per holder per day after consolidation was 32 minutes. Savings per operator were slightly higher at 41 minutes. The total time saved per day for the entire sample was 107 hours; this gave a potential total saving per year of 39,055 hours, 194.6 hours per holder. However, time saved varies both between and within samples from different villages.

In the Palechori sample the average daily time saved travelling to plots after consolidation was 11 minutes. But for those holders who re-located to dispersed farmsteads the time savings are far greater: an average per holder of 115 minutes and a range from 60 to 240 minutes per day. For the samples from Kissonerga and Khlorkas the daily savings were the same as the total sample mean - 32 minutes per holder. For the Akrounda/Phinikaria sample the mean daily figure was 34 minutes saved. In all cases savings per operator were slightly higher than those per owner and all operators who reported savings in time travelling agreed that such reductions had allowed increased agricultural activity.

6.3.2. Changes in Labour Input

Increases in labour input after land consolidation are clearly evident from an investigation of farmer typology and changing land uses. For the total sample 16.5% of holders had non-agricultural occupations before land consolidation while 49% had a part-time and 34.5% a full-time interest in

TABLE 6.10TIME SPENT FARMING BEFORE AND AFTER CONSOLIDATION

Sample Village	Hours Spent Farming Before		Hours Spent Farming After	
	Summer	Winter	Summer	Winter
Palechori	230.8	120.0	562.0	309.6
Kissonerga	356.6	219.6	612.4	364.2
Khlorakas	391.4	255.6	641.2	395.4
Akrounda/Phinikaria	245.0	129.6	550.8	310.2

Source: Author's questionnaire survey

agriculture. The majority of full-time farmers before consolidation were located in the larger holding-size groups and conversely most part-time farmers had smaller holdings. After consolidation the pattern had changed with the number of holders who were non-operators falling to 6% of the total sample, full-time farmers increasing to 48.5% and part-timers showing a slight fall to 45.5%.

The average number of hours per day worked by both full-time and part-time farmers increased after consolidation. Before consolidation the average time spent farming on a full-time holding was 5.7 hours per day in summer and 2.8 hours in winter and, on a part-time holding, 4.2 hours in summer and 1.2 hours in winter. After consolidation average time worked increased for full-time farmers to 8.2 hours per day in summer and 5.7 hours a day in winter and, for part-time farmers, to 4.6 hours in summer and 1.8 hours in winter. If these variations in farming time are considered together with changes in farmer typology then land consolidation has resulted in an average increase in yearly hours spent farming from 310.8 hours to 668.2 hours in winter and from 804.9 hours to 1,214 hours in summer. This represents a 108% increase in winter farming activity and a 51% increase in summer farming activity. Table 6.10 breaks these changes down by village and shows that the highest proportionate savings were made in the Palechori sample area (144% increase in time spent farming in summer; 157% in winter), closely followed by the Akrounda/Phinikaria sample (124% in summer; 141% in winter).

A more specific examination of the distance-reducing aspect of land consolidation on labour input is obtained by the calculation of such inputs associated with particular land-use zones at varying distances from the village centre. This is obtained by using standard input measures for specific crop types given in an earlier study (Papachristodoulou, 1976) and by using some of the land-use data presented in the previous chapter (see Section 5.2.2). As was noted earlier (Chapter 5, Section 5.2.3), this distance-based analysis can only be carried out for three of the schemes -

Kissonerga, Khlorakas and Akrounda. Labour inputs in hours per year per donum are calculated for three different years using the following simple formula:

$$L.I. = \frac{\sum_1^n (x,y)}{100}$$

where L.I. is the labour input, x is the percentage of any distance zone under a particular land use, y is the labour input associated with that land-use and n is the number of land-uses in the zone.

In the Kissonerga project area, total labour input has shown a rapid increase, rising from 1,122.4 hours per year per donum before consolidation to 1,630.5 hrs./yr./d. three years after consolidation and to 2,677.5 hrs./yr./d. seven years after consolidation. (Table 6.11). As can be seen from the table, the most significant change occurred between 1977 and 1981, three and seven years after consolidation. Before consolidation labour inputs fell rapidly with increasing distance from the village centre, particularly in zones more than 1 km. away. Three years after consolidation labour inputs had risen in nearly all zones and increased activity levels had pushed outwards from the village centre with a drop-off point around 2.0 kms. In 1981 the picture had changed again, this time with a slight fall in labour input in the 0.5 - 1.5 km. bands, but a rapid increase in most other zones. The outward push of labour activity spread to the edge of the project area with a slight drop-off at 4.0 - 4.5 kms. from the village centre. Labour input had now become greatest in the zone 7.0 - 7.5 kms. away.

For the Khlorakas scheme the effects of consolidation on labour input have been very different (Table 6.12). Immediately after land consolidation total labour input fell from 1,444.4 hrs./yr./d. to 900.4 hrs./yr./d. Four years later, in 1981, it had increased and passed the pre-consolidation level, reaching 1,635.8 hrs./yr./d. Mean labour input per zone stands at 181.7 hrs./yr./d. slightly above the 1971 figure of 160.5 hrs./yr./d. However, while changes in total labour input have not been all that startling the

TABLE 6.11LABOUR INPUT BY DISTANCE FROM VILLAGE: KISSONERGA

Distance Zones (km.)	Before Consolidation (hours/year/donum)	3 Years After Consolidation (hours/year/donum)	7 Years After Consolidation (hours/year/donum)
0-0.5	260.6	247.5	252.7
0.5-1.0	307.3	272.6	244.9
1.0-1.5	90.7	315.7	198.2
1.5-2.0	79.7	139.9	158.9
2.0-2.5	84.5	82.0	134.7
2.5-3.0	108.1	52.2	146.5
3.0-3.5	46.8	91.2	146.8
3.5-4.0	54.9	71.9	211.1
4.0-4.5	25.6	89.4	77.3
4.5-5.0	22.2	152.1	168.5
5.0-5.5	28.6	32.8	135.0
5.5-6.0	3.7	44.4	135.2
6.0-6.5	2.1	12.5	188.2
6.5-7.0	2.6	18.9	184.5
7.0-7.5	0.0	8.5	274.6
Total	1122.4	1630.5	2677.5
Mean	74.8	108.7	178.5

Source: Author's Land-Use Survey

TABLE 6.12LABOUR INPUT BY DISTANCE FROM VILLAGE: KHLORAKAS

Distance Zones (km.)	Before Consolidation (hours/year/donum)	3 Years After Consolidation (hours/year/donum)	7 Years After Consolidation (hours/year/donum)
0-0.5	n.a.	n.a.	n.a.
0.5-1.0	n.a.	n.a.	n.a.
1.0-1.5	189.0	88.2	303.7
1.5-2.0	337.2	181.4	279.0
2.0-2.5	289.8	118.2	275.1
2.5-3.0	270.2	91.8	134.3
3.0-3.5	104.6	48.7	110.5
3.5-4.0	89.7	95.4	78.0
4.0-4.5	74.4	58.1	109.6
4.5-5.0	72.5	130.3	90.6
5.0-5.5	17.0	96.3	254.1
Total	1444.4	900.4	1635.8
Mean	160.5	100.0	181.7

Note: n.a. = not applicable (no consolidated land within this zone)

Source: Author's Land-Use Survey

TABLE 6.13LABOUR INPUT BY DISTANCE FROM VILLAGE: AKROUNDIA

Distance Zones (km.)	Before Consolidation (hours/year/donum)	3 Years After Consolidation (hours/year/donum)	7 Years After Consolidation (hours/year/donum)
0-0.5	62.1	254.5	388.3
0.5-1.0	64.8	257.0	332.3
1.0-1.5	69.0	177.0	242.1
1.5-2.0	11.7	63.6	146.0
2.0-2.5	11.9	25.7	60.0
2.5-3.0	0.7	63.0	272.0
3.0-3.5	0.0	28.3	400.8
3.5-4.0	0.2	43.0	314.5
Total	222.4	912.1	2156.0
Mean	27.8	114.0	269.5

Source: Author's Land-Use Survey

changes by distance zone are more significant. Before consolidation labour input was most intense in an area 1.5 to 3.0 kms. from the village centre. Three years after consolidation labour inputs had declined in all zones but especially in the 1.5 - 3.0 kms. band. Seven years after consolidation the shift in labour input has been both inward and outward, with the most labour-intensive areas occupying zones at 1.0 - 2.5 kms. and 5.0 - 5.5 kms. from the village.

By contrast, in the Akrounda project area labour input has shown a consistent and quite dramatic increase after land consolidation (Table 6.13). Before consolidation total labour input was only 222.4 hrs./yr./d. This rose sharply to 912.1 hrs./yr./d. three years after consolidation. By 1981 labour input had tripled to 2,156 hrs./yr./d. Mean labour input per zone showed a similar rise from 27.8 hrs./yr./d. before consolidation to 269.5 hrs./yr./d. seven years after consolidation. Not only has labour input increased in total it has also pushed outward from fields close to the village centre, particularly dramatic relative increases being registered in the outer (2.5 - 4.0 kms.) zones.

6.3.3. Farm Input and Output Levels

The reduction in travelling time allowing increased labour inputs and the changes in land-use described in details in Chapter 5, have led to changes in a number of farm inputs and outputs. In this study farm outputs are measured by the net farm income before and after land consolidation. Farm inputs, excluding labour, are measured by the total expenditure on farming operations before and after land consolidation. Direct comparability of farm inputs and outputs for the two time periods is not possible. Moreover, the post-consolidation figures must be adjusted to take account of the rate of inflation in the intervening period. This then gives a measure of 'real' change. The rate of inflation between 1972 and 1980 was calculated at 65.5% on the basis of National Westminster Bank Economic Reports. Net income figures calculated for the year 1980 were adjusted using the formula:

TABLE 6.14

NET INCOME BEFORE AND AFTER LAND CONSOLIDATION: TOTAL SAMPLE (₺CY)

	Before Consolidation (1972)		After Consolidation (1980)		% Change	
	Mean/ Holder	Mean/ Operator	Mean/ Holder	Mean/ Operator	Holder	Operator
HOLDING GROUP (donums)						
1-2	32.1	78.4	107.2	143.6	333.9	83.2
2-5	144.4	167.1	380.2	392.2	263.2	134.7
5-10	168.6	213.1	406.6	506.2	241.1	137.5
10-20	334.6	382.4	563.7	617.1	168.4	61.4
Over 20	256.2	284.1	525.5	594.8	205.1	109.4
VILLAGE						
Palechori	40.2	57.4	323.0	345.9	703.5	502.6
Kissonerga	166.5	189.2	445.3	473.9	167.5	150.5
Khlorakas	362.0	411.3	484.0	515.0	33.7	25.2
Akrounda/Phinikaria	38.3	44.5	379.5	403.7	890.9	807.2
OVERALL MEAN	183.8	225.1	422.5	450.6	129.9	100.2

Note: 1980 income figures adjusted for inflation

Source: Author's questionnaire survey

$$N = \frac{n \times 100}{r + 100}$$

where N is the adjusted net income figure, n is the raw net income figure and r is the rate of inflation.

After consolidation net farm incomes for the total sample of holders showed a rapid increase rising from £CY183.8 per holder to £CY422.5. When these changes are examined per operator the mean income rose from £CY220.1 to £CY564.6, a rather more substantial rise than per holder figures. When the data are broken down by holding size (see Table 6.14) it is evident that the greatest increase in percentage incomes has occurred in the smaller land-holding groups.

Other differences emerge when the adjusted net income data are separated out by village. For the Palechori sample the mean per holder income increased from £CY40.2 before consolidation to £CY323 by 1980; the 'per operator' figures were £CY57.4 before and £CY345.9 after. These are increases of the order of 500 - 700%. When these changes are examined by income size groups it is clear that the greatest income increases have occurred for the lower income groups, a phenomenon partly explained by the lower base levels against which percentage changes are measured. For Palechori, 86% of the sample had farm incomes below £CY100 per annum before consolidation; after consolidation this proportion had dropped to 18%.

The Akrounda/Phinikaria sample experienced even higher levels of per holder and per operator net farm income growth than the Palechori sample (Table 6.14). For Kissonerga and Khlorakas the increases are much more modest, although the overall income levels are much higher, reflecting the greater agricultural prosperity of this zone to the north of Paphos. The very modest increases in Khlorakas, where 20% of holders are still below £CY100 net farm income, indicate this village's continuing problems of stagnation at a high level of agricultural intensity.

TABLE 6.15

INCOME PER DONUM FOR OWNED AND OPERATED LAND IN SAMPLE VILLAGES
BEFORE AND AFTER CONSOLIDATION (£CY)

Size Class:	Before Consolidation					After Consolidation (£CY ajusted)				
	1-2	2-5	5-10	10-20	Over 20	1-2	2-5	5-10	10-20	Over 20
PALECHORI:										
Owned	25.0	7.1	10.9	0.0	0.0	78.6	82.1	56.8	33.1	17.2
Operated	45.0	16.4	26.7	0.0	0.0	87.6	91.7	59.6	52.1	50.3
KISSONERGA:										
Owned	n.a.	40.2	18.7	12.4	8.2	n.a.	116.0	46.9	30.5	20.9
Operated	n.a.	102.4	31.4	19.9	20.2	n.a.	146.8	50.5	40.1	24.0
KHLORAKAS:										
Owned	n.a.	84.4	35.0	58.4	3.4	n.a.	97.1	59.0	58.7	11.0
Operated	n.a.	109.0	59.3	107.7	40.9	n.a.	110.1	67.3	69.8	40.1
AKROUNDA/PHINIKARIA:										
Owned	n.a.	20.1	8.4	7.5	0.0	n.a.	89.7	76.7	64.2	18.3
Operated	n.a.	35.2	14.2	12.6	0.0	n.a.	102.4	89.4	65.1	57.4
TOTAL SAMPLE:										
Owned	25.0	37.6	23.3	23.8	8.0	78.6	103.8	52.8	38.6	15.3
Operated	45.0	90.6	38.8	42.8	27.3	87.6	123.8	57.0	49.8	30.7

Source: Author's questionnaire survey

TABLE 6.16

FARM EXPENDITURE BEFORE AND AFTER CONSOLIDATION BY HOLDING SIZE AND SAMPLE VILLAGE

	Before Consolidation (₹CY)			After Consolidation (₹CY adjusted)		
	Total Expenditure	Mean Per Holder	Mean Per Operator	Total Expenditure	Mean Per Holder	Mean Per Operator
HOLDING SIZE:						
1-2 donums	135	19.3		278	39.7	
2-5 donums	5,630	67.0		12,387	147.5	
5-10 donums	12,480	180.0		15,704	227.5	
10-20 donums	5,050	157.8		9,644	301.3	
Over 20 donums	2,850	356.0		2,961	370.0	
VILLAGE:						
Palechori	1,105	22.1	31.5	3,801	76.0	80.8
Kissonerga	6,310	126.2	143.4	8,837	176.1	188.1
Khlorakas	12,426	248.0	326.0	19,529	390.0	433.8
Akrounda/Phinikaria	891	17.8	24.1	5,583	111.6	193.9

Source: Author's questionnaire survey

A similar pattern is evident when the income data are tabulated on an area basis (Table 6.15). The greatest increases in income per donum are for the smaller holdings (especially the modal 2 - 5 donum class) and for the 'poorer' villages of Palechori, Akrounda and Phinikaria. Income per donum is at a higher level for the Paphos villages but changes are smaller; indeed, for Khlorkas, they are minimal.

Increased farm inputs after land consolidation for the total sample of holders are also clearly evident. Farm expenditure rose from an aggregate of £CY26,145 to £CY67,810. The mean per holder increased from £CY130.7 to £CY339.0 and the mean per operator from £CY156.5 to £CY360.7. When these figures are adjusted for inflation the post-consolidation average per holder falls to £CY204.8 and per operator to £CY217.9 (Table 6.16). This represents an increase in real expenditure of 56.6% per holder and 39% per operator. When these changes are broken down by holding size groups it is apparent that levels of expenditure are not surprisingly greatest for the largest holding size groups. However, the increases in the relative levels of farm expenditure are most significant in the small 2 - 5 donum class. Here expenditure rose by 120% per holder and 123% per operator (Table 6.16).

Like the changes in farm incomes noted earlier, the magnitude of increases in farm expenditure differs markedly between the sample groups (see Table 6.16 again). In the Palechori and Akrounda/Phinikaria samples expenditure levels both before and after consolidation are much lower than those recorded for holders in Kissonerga and Khlorkas. However, the magnitude of change is much greater for the former samples. In the Akrounda/Phinikaria samples mean real expenditure rose by 526% per holder and 704% per operator, while for the Palechori group of respondents it rose by 245% per holder and 155% per operator. Yet in Kissonerga expenditure increased by only 49% per holder and 34.5% per operator and, in Khlorkas, it rose by 57% per holder and 32.8% per operator.

TABLE 6.17

EXPENDITURE PER DONUM FOR OWNED AND OPERATED LAND IN SAMPLE VILLAGES

Size Class:	Before Consolidation					After Consolidation (€CY adjusted)				
	1-2	2-5	5-10	10-20	Over 20	1-2	2-5	5-10	10-20	Over 20
PALECHORI:										
Owned	15.0	4.8	5.2	0.0	0.0	23.7	27.5	9.7	19.0	17.3
Operated	27.0	11.3	12.6	0.0	0.0	26.5	38.8	10.2	29.7	50.3
KISSONERGA:										
Owned	n.a.	17.3	20.1	6.9	25.0	n.a.	33.7	21.3	12.0	19.7
Operated	n.a.	63.6	28.5	11.3	75.0	n.a.	42.6	22.5	15.8	27.5
KHLORAKAS:										
Owned	n.a.	41.1	45.2	25.2	3.4	n.a.	71.4	52.8	45.6	7.2
Operated	n.a.	53.2	72.7	57.5	14.1	n.a.	80.9	60.2	54.1	26.2
AKROUNDA/PHINIKARIA:										
Owned	n.a.	12.0	4.2	5.1	2.3	n.a.	31.0	31.4	21.4	28.4
Operated	n.a.	23.0	8.7	11.2	6.4	n.a.	42.0	29.2	19.2	12.3
TOTAL SAMPLE:										
Owned	15.0	17.4	23.4	10.7	10.3	23.7	38.2	29.5	20.5	10.7
Operated	27.0	42.0	37.7	19.2	31.4	26.5	44.0	31.9	26.5	21.5

Source: Author's questionnaire survey

Levels of expenditure per unit area of land owned and operated have also changed. For the total sample expenditure per donum rose from £CY22.1 to an adjusted level of £CY28.9. However, levels per operated unit have shown a decrease, falling from £CY69.3 per donum to £CY33.7 per donum. Again, the most significant increases appear to have occurred in the smaller holding size groups and in the villages of Palechori, Akrounda and Phinikaria (Table 6.17).

6.3.4. Household Indebtedness

The existence of a degree of indebtedness may be an indication of the long-term attachment of operators to the agricultural sector or it may be the root cause of holders working their land. The reasons for borrowing are thus of particular interest here, since borrowing in order to invest in fixed capital such as farm equipment reveals a degree of confidence about the future viability of the enterprise and relates to the value of non-land resources discussed in the next section.

For the total sample indebtedness increased considerably after land consolidation rising from a total of £CY24,381 to an adjusted level of £CY96,634. Mean debt per holder rose from £CY121.9 to £CY483.1 and per operator from £CY146.8 to £CY514.0. This represents a real increase in indebtedness of 300% per holder and 252% per operator. When these changes are broken down by holding size groups it would appear that the level of indebtedness increases with holding size, although the relative change before and after consolidation is the same with the exception of the 1 - 2 donum group (Table 6.18).

The source of borrowing is also important here, since a high level of indebtedness from institutional sources implies considerable confidence on the part of both debtors and creditors concerning the future funds for repayment. For the total sample the main source of loans (96.4% of all debtors) was from the local agricultural co-operative. In a much smaller number of

TABLE 6.18

INDEBTEDNESS BEFORE AND AFTER CONSOLIDATION BY HOLDING SIZE AND SAMPLE VILLAGE

	Debt Before Consolidation (£CY)		After Consolidation (£CY adjusted)	
	Total	Mean Per Holder	Total	Mean Per Holder
HOLDING SIZE:				
1-2 donums	825	117.8	1,812	258.9
2-5 donums	7,421	88.2	27,994	333.2
5-10 donums	8,764	127.0	39,698	575.2
10-20 donums	4,080	127.5	14,683	458.8
Over 20 donums	3,300	412.5	12,447	1,555.8
VILLAGE:				
Palechori	10,714	53.6	32,344	646.5
Kissonerga	5,814	29.1	21,903	444.1
Khlorakas	4,741	23.7	19,879	897.0
Akrounda/Phinikaria	3,112	15.6	18,519	370.4

Source: Author's questionnaire survey

TABLE 6.19

CAUSES OF INDEBTEDNESS BEFORE AND AFTER LAND CONSOLIDATION
FOR TOTAL SAMPLE (n = 200)

Reasons for Indebtedness		Before Consolidation (% holders)	After Consolidation (% holders)
	Not in debt	24.0	27.0
	Living Expenses	10.0	2.0
Social	(Education of family	16.0	5.0
	(Dowry	24.0	7.5
	(General farming expenses	6.5	9.0
Agricultural	(Irrigation	15.0	29.0
	(New machinery	0.5	2.5
	(Greenhouses	0.0	9.5
	(New crops	0.0	7.0

Source: Author's questionnaire survey

cases (3.6% of all debtors) loans were given by one of the national banks.

The main reasons for indebtedness both before and after land consolidation are given in Table 6.19. In the Cypriot context it must be noted that much borrowing is for private or social purposes and not directly related to agricultural production, although the necessity of meeting social obligations may lead to an upturn of additional farming activities in order to repay debts incurred for this purpose. Loans for consumption purposes are generally indicative of poverty and the inability of household income to provide a satisfactory level of subsistence. Significantly the main reasons for indebtedness changed after consolidation. Before consolidation major debt sources were for social and consumption purposes and together these accounted for 65.7% of all debts. Particularly notable were loans needed to finance dowries. Agricultural indebtedness, accounting for 34.3% of all borrowing, was mainly influenced by the cost of obtaining water. After consolidation, levels of borrowing for agriculture increased and accounted for 82.8% of all debts. Indebtedness for consumption fell to only 2.7% and the borrowing of money for dowry purposes also declined substantially, although changes in this factor may reflect the stage-in-the-life cycle of holders. The most important elements in agricultural borrowing are loans for greenhouses, new crops and irrigation facilities. Investment in fixed capital assets accounts for 29% of all debts, indicating a substantial investment in agriculture.

On a village level (Table 6.18) highest debt levels are recorded by the Palechori sample. This is partly a reflection of the age structure of holders here where a large number have maturing children; 57% of debtors have borrowed money for financing the building of a dowry house for their offspring, 5.2% of all money loaned was for educating children and only 32% for agricultural purposes. Indebtedness is much lower in the other villages and is mainly to finance specifically agricultural improvements - irrigation equipment, new crops, machinery and, in Khlorakas, greenhouses.

6.3.5. Non-Land Resources

Non-land resources owned by the holder are both a reflection and a determinant of the profitability of the enterprise. In this study non-land resources exclude farm buildings. This is partly because of the difficulty of determining their original cost and partly because only one project area, in Palechori, contains a substantial number of buildings. The evaluation of non-land resources in this area must, therefore, be considered only partial. This investigation concentrates on changes after consolidation in investments in farm machinery. In most cases the original cost of machinery purchased after land consolidation was given, rather than the current value. Estimates for the latter were calculated using price indices from the Agri-cultural Survey (1980) and discounting according to appropriate guidelines laid down in the Norm Input/Output Data (Papachristodoulou, 1976).

For the total sample of holders the number of machines increased from 22 to 235 after consolidation (Table 6.20). Tractors and mechanical sprays showed the greatest growth. Estimated total cost of machinery before consolidation was £CY582 with a mean per holder of only £CY2.9. After consolidation this rose to an adjusted total level of £CY147,503 with a mean per holder of £737.5. When the changes are broken down by holding size groups it is notable that the 2 - 5 donum group shows the greatest increase in farm machinery from 12 machines before consolidation to 87 after consolidation. This group also contains the largest investment in machinery per owned and per operated donum (Table 6.20).

Between the sample villages the most significant changes in non-land resources have occurred in the Kissonerga and Akrounda/Phinikaria samples. Here the mean investment per holder rose from £CY5 to more than £CY500. In Palechori, the total numbers of machines rose substantially with a significant increase in the numbers of tractors from 5 to 37. Mean investment per holder in Palechori increased from £CY2.3 to £CY420. However, in this project, the considerable investment in farm buildings and livestock would

TABLE 6.20

OWNERSHIP OF FARM EQUIPMENT BEFORE AND AFTER CONSOLIDATION FOR TOTAL SAMPLE (n = 200)

Size Classes (donums):	1 - 2		2 - 5		5 - 10		10 - 20		Over 20	
	Before	After	Before	After	Before	After	Before	After	Before	After
Tractor	1	3	6	41	0	23	4	12	0	5
Rotavator	0	2	3	13	0	15	1	11	2	2
Mechanical Spray	0	1	3	29	2	17	0	24	0	2
Irrigation Equipment	0	0	0	4	0	7	0	3	0	1
Total	1	6	12	87	2	73	5	50	2	10
Total Cost (£CY)	29.1	773.4	349.2	57,975.0	66.9	62,531.7	145.5	20,018.1	43.6	6,404.8
Cost per Holder	4.1	110.4	4.5	690.0	0.9	906.2	4.4	625.4	4.6	800.6
Cost per Operator	4.8	122.2	5.3	762.8	1.1	933.3	5.0	645.7	6.2	800.6
Mean per donum	3.1	76.3	1.1	178.9	0.1	117.6	0.3	42.7	0.1	23.2
Mean per Operated donum	5.4	85.2	2.6	214.5	0.2	127.0	0.6	55.1	0.8	46.6

Note: Cost figures after consolidation are adjusted for inflation

Source: Author's questionnaire survey

substantially increase this figure. In Khlorakas levels of mechanization, higher than the other samples before consolidation, have not increased so much rising from £CY57.4 per holder before consolidation to £CY454 after.

6.4. SOCIAL ASPECTS

This section considers the effect of land consolidation on the social life of the sample villages. It must be stressed that this is not a comprehensive study; only certain key variables have been selected for investigation. These include: farmer typology, rural or urban residence, improvements in living standards, role of children in agriculture and changes in social attitudes.

6.4.1. Changes in Farmer Typology

Some of the changes in farmer typology for the total sample of holders have already been discussed. In this section the differences between village samples are examined and interest focussed particularly on movements from non-farm occupations into the agricultural sector and their subsequent effects on the farming community.

The Palechori and Akrounda/Phinikaria samples had the highest percentage of non-farmers before consolidation (see Table 6.21). Pre-consolidation activity was dominated by a part-time interest which accounted for nearly 60% of respondents. Full-time farmers were much fewer - 12% in Palechori and 14% in Akrounda/Phinikaria.

Table 6.22 breaks three villages down by holding size class (the Akrounda/Phinikaria sample is omitted as it is very similar to that for Palechori). The significance of the percentages quoted in Table 6.22 may be limited by the small sample sizes ($n = 50$ for each village), but some clear contrasts and changes nevertheless emerge. In Palechori it is the larger ownership classes which contained the majority of the non-farmers before consolidation, whilst the smaller sizes of holding are more associ-

TABLE 6.21CHANGE IN FARMER TYPOLOGY

Village	% Holders Before Consolidation who were			% Holders After Consolidation who were		
	Non-Farmers	Part-Timers	Full-Timers	Non-Farmers	Part-Timers	Full-Timers
Palechori	30	58	12	6	58	36
Kissonerga	12	50	38	6	44	50
Khlorakas	12	38	50	6	36	58
Akrounda/Phinikaria	28	58	14	10	52	38

Source: Author's questionnaire survey

TABLE 6.22

CHANGE IN FARMER TYPOLOGY BY HOLDING SIZE GROUP

Village and Size Class (donums)	% of Holders Before Consolidation who were			% of Holders After Consolidation who were		
	Non- Farmers	Part- Timers	Full- Timers	Non- Farmers	Part- Timers	Full- Timers
PALECHORI						
1-2	14.3	71.4	14.3	14.3	57.1	28.6
2-5	21.7	60.8	17.5	4.4	60.8	37.8
5-10	31.2	62.5	6.3	0.0	62.5	37.5
10-20	100.0	0.0	0.0	33.3	33.3	33.3
Over 20	100.0	0.0	0.0	0.0	0.0	100.0
KISSONERGA						
2-5	26.6	47.8	26.1	13.0	43.5	43.5
5-10	0.0	46.6	53.4	0.0	46.6	53.4
10-20	0.0	50.0	50.0	0.0	50.0	50.0
Over 20	0.0	100.0	0.0	0.0	0.0	100.0
KHLORAKAS						
2-5	6.7	26.7	66.6	6.7	26.7	66.6
5-10	21.8	56.5	21.7	8.7	56.5	34.8
10-20	0.0	11.1	88.9	0.0	0.0	100.0
Over 20	0.0	33.3	66.7	0.0	33.3	66.7

Source: Author's questionnaire survey

ated with part-time farming. The 2 - 5 donum class is the only size group to contain a significant number of full-time farmers. Three trends are evident after consolidation in Palechori: non-farmers are reduced, part-timers remain relatively stable in number and full-timers increase.

In the other two villages in Table 6.22 the changes are less startling. Non-farmers accounted for only 12% of respondents, this proportion halving after consolidation for both villages (Table 6.21). When these changes are examined for holding size classes, it is found that in Kissonerga the 2 - 5 donum class witnessed a big drop in non-farmers whilst the '20 donum and over' class shifted from part-time to full-time and, in Khlorakas, the 5 - 10 donum class saw a shift from non-farming to full-time farming (Table 6.22).

These changes cannot but affect the social and economic nature of the communities concerned. Increased farm activity has increased farm incomes. Full-time and part-time incomes have doubled, but expenditure on part-time holdings has declined after consolidation (Table 6.23). The entry of 53 land holders into the agricultural sector had added a sum of £CY18,929 (adjusted to pre-consolidation level) to total annual rural income of the sample. This increment has naturally been most important in those villages - Palechori, Akrounda and Phinikaria - which have seen the most marked changes in farmer typology. Higher farm incomes also affect the wider village economy, with extra expenditure per holder on services and consumer items. In some cases the decision to leave non-farm jobs for a full-time agricultural occupation has introduced a new kind of farmer to the agricultural scene. Often he is younger, more innovative and ambitious than his established counterpart and, in some cases, where a move from towns to farmsteads or to the village has occurred there has been a transference into the countryside of urban values and life styles. For example, in the Palechori scheme, 25% of new operators living in farmsteads had built extensive 'urban' structures, often of two or three floors with ample garage space. For such

TABLE 6.23CHANGE IN FARM INPUTS AND OUTPUTS BY FARMER TYPE: TOTALSAMPLE (n = 200)

	Before Consolidation		After Consolidation	
	Part-Time	Full-Time	Part-Time	Full-Time
Total Income (£CY)	11,915	24,635	26,235	58,783
Mean per Operator	121.6	357.0	288.9	606.0
Total Expenditure (£CY)	12,055	13,975	8,994	31,979
Mean per Operator	123.0	202.5	98.8	329.6

Note: After consolidation figures are adjusted for inflation

Source: Author's questionnaire survey

holders farming is big business. At the same time they have introduced small family sizes into the area, reducing the need for home consumption and non-farming expenditure and this may potentially have tremendous repercussions for a social structure traditionally characterized by large extended families.

6.4.2. Changes in Place of Residence

In many cases the increased movement into the farming sector after consolidation has had a stabilising effect on potential population changes in rural areas. Data relating to place of residence of the total sample have already been described at the start of this chapter and in Table 6.1. Population movements after consolidation can be classified into three types: rural-urban migration from 'consolidation villages' to the major towns, an urban-rural movement from towns to dispersed farmsteads and villages and a rural-rural movement from village to dispersed farmstead. The last two migratory processes have been the result of the consolidation programme, the first is part of a long-established trend to rural depopulation.

That land consolidation has been able to check rural-urban migration and, in fact, reverse the flow is best exemplified by the development of farmsteads in the Palechori project area. Twelve (or 24%) holders interviewed in this scheme lived in farmsteads and one quarter of these had moved from Nicosia. The majority of farmsteads (10 out of the 12) came from the 2 - 5 and 5 - 10 donum holding groups. All holders living in farmsteads operated their land, seven being full-time farmers and five part-timers (Table 6.24). This compares to the situation in Palechori village where 61% of holders were part-time and 35% full-time farmers. Holders resident in Nicosia on the other hand, nearly all of whom had small holdings below 5 donums, could only pursue farming on a part-time or mere hobby basis.

In all cases farmsteads in Palechori had been built after consolidation and a significant proportion of holders living in these structures had non-agricultural occupations before consolidation (Table 6.24). Holders in farmsteads had a mean age of 51 years compared to 58 years for holders in

TABLE 6.24

FARMER TYPOLOGY BEFORE AND AFTER CONSOLIDATION BY
LOCATION OF RESIDENCE: PALECHORI SAMPLE

	Village	Nicosia	Farmstead
BEFORE			
Non-farmer	8	3	4
Part-time farmer	18	4	7
Full-time farmer	5	0	1
AFTER			
Non-farmer	1	2	0
Part-time farmer	19	5	5
Full-time farmer	11	0	7

Source: Author's questionnaire survey

the village and 38 years for holders living in Nicosia. Farm incomes for holders on farmsteads were generally higher than holders living elsewhere - a mean of £CY490 per annum compared to £CY320.

In the Akrounda/Phinikaria sample the situation is rather different. Here land consolidation has been unable to stem the rural out-movement. Before consolidation 80% of holders lived in the village; after consolidation the figure dropped to 60%, ten holders having moved into Limassol, returning to their holdings for part-time work only.

In Kissonerga and Khlorakas the majority of holders continued to live in their respective villages, there being only a slight movement of a handful of holders to Paphos town. In these two schemes consolidation has had a stabilising influence, re-inforcing village ties. Undoubtedly the closeness of these villages to Paphos town has reduced the need to move.

6.4.3. Improvements in Living Standards

Some simple indicators of living standards, generally applicable in the Cypriot context, have been used in this study. In Cypriot society such material possessions not only convey an outward indication of wealth but also have implications for an individual's position in the social structure. While the variables used in this analysis are limited in scope, their investigation does provide some basis for documenting changing social conditions of holders after consolidation.

For the total sample there was a rapid increase in the ownership of consumer items after land consolidation. This is indicative of a move towards higher living standards, although its real significance could only be assessed if compared with changes in a sample of holders from an unconsolidated area over the same time period, and this was not done given the constraints of time. Whilst increased consumerism amongst holders benefiting from consolidation probably reflects higher disposable incomes, a possibly negative social effect might be the creation of an elite class within the agricultural

sector. I shall return to this problem later.

The most notable consumer item increase has been in the number of television sets owned. This rose from 56 before consolidation to 156 after. Refrigerator and washing machine ownership also increased rapidly after consolidation. The number of cars and other vehicles owned by the sample rose from 52 to 109 and only 45.5% of holders did not possess a vehicle after consolidation. Donkey ownership, on the other hand, declined: 51% owned donkeys before consolidation, 39% after.

When these changes are broken down by holding size groups it is apparent that the larger ownership classes had the greatest pre-consolidation consumer levels, particularly in the case of refrigerators and washing machines (see Table 6.25). However, most notable changes in the relative number of material possessions have occurred in the 2 - 5 donum holding group. This is particularly true of car and van ownership. Significantly, donkey ownership was greatest in the 1 - 2 donum class, a reflection of the low incomes of this holding group. After consolidation donkey ownership levels have fallen rapidly for most ownership classes. Nevertheless, donkeys are still important in rural Cyprus, especially on non-mechanized peasant farms. In more backward regions the donkey remains a prestigious possession.

Comparison of changes in the sample villages reveal considerable variations from the general picture (Table 6.26). Both the Kissonerga and Khlorakas samples had higher consumer levels before consolidation than respondents from the Palechori or Akrounda/Phinikaria schemes. Most significant differences were in the numbers of cars, refrigerators and washing machines owned. However, most rapid changes in consumer items have occurred in the Palechori and Akrounda/Phinikaria samples, although these new levels were still slightly lower than those in Kissonerga and Khlorakas. By contrast, donkey ownership, lowest in the latter two villages, has also

TABLE 6.25

CHANGES IN MATERIAL POSSESSIONS BY HOLDING SIZE GROUP FOR TOTAL SAMPLE (n = 200; DATA IN %)

Holding Size Classes (donums):	1 - 2		2 - 5		5 - 10		10 - 20		Over 20	
	Before	After	Before	After	Before	After	Before	After	Before	After
Radio	85.7	100.0	92.8	100.0	88.4	95.6	90.6	93.7	100.0	100.0
Television	28.6	54.1	25.0	71.4	31.8	78.2	25.0	93.7	37.5	100.0
Refrigerator	14.3	54.1	32.1	90.5	53.6	91.3	62.5	93.7	75.0	100.0
Washing Machine	14.3	14.3	11.9	34.5	8.7	36.2	15.6	56.2	25.0	100.0
Car	0.0	42.8	29.7	94.7	31.8	56.5	21.8	43.7	50.0	87.5
Van/Pick-up	0.0	14.3	11.9	92.8	5.8	27.5	0.0	21.8	0.0	62.5
Motorbike	0.0	0.0	9.5	19.0	7.2	13.0	3.1	6.2	50.0	100.0
Donkey	71.4	42.8	47.6	42.8	50.7	28.9	62.0	53.1	0.0	25.0

Source: Author's questionnaire survey

TABLE 6.26

CHANGES IN MATERIAL POSSESSIONS BY SAMPLE VILLAGE (%)

	Palechori		Kissonerga		Khlorakas		Akrounda/ Phinikaria	
	Before	After	Before	After	Before	After	Before	After
Radio	94	100	90	98	90	94	84	100
Television	24	60	24	78	40	96	8	62
Refrigerator	32	80	42	94	66	94	14	78
Washing machine	6	26	14	52	14	32	2	30
Car	22	50	42	66	32	36	24	48
Van/Pick-up	4	20	8	20	10	16	4	22
Motorcycle	0	4	10	22	2	6	2	6
Donkey	70	58	48	20	68	38	72	54

Source: Author's questionnaire survey

declined most rapidly in these, while in the highland settlements of Akrounda/Phinikaria and Palechori the donkey has retained its useful role as a work animal.

6.4.4. Children in Agriculture

The role of holders' children in agriculture was measured in two ways. Firstly, data relating to holders' attitude to their children taking up farming, and the reasons for these feelings, were recorded. Secondly, information relating to holders' offspring, their current occupation and place of residence was obtained. Comparison of these two data sets shows the considerable variation between holders' wishes and the actual behaviour of their families.

For the total sample of holders there was a notable attitudinal change towards children farming after land consolidation. Holders wanting their offspring to operate their land rose from 27.8% to 68.6% of the total and this was reflected in all the villages. When this change of attitude is considered by size of holding (Table 6.27) it is clear that the most significant changes in attitude have occurred in the 2 - 5 donum and 5 - 10 donum ownership classes. By contrast, half the holders in the 1 - 2 donum group did not want their offspring to farm, reflecting the inability of the existing land resource to provide an adequate income. This was borne out by consideration of the main objections to children farming which included small size of ownership, low living standard and the lack of government assistance. Primary reasons for a positive change of view were the high income from part-time farming, job satisfaction and feelings of personal attachment to the land.

When the actual behavioural patterns of children are considered then it is evident that the majority of offspring pursue non-agricultural occupations and that their long-term potential for agricultural activity in consolidation schemes is low, even on a part-time or hobby basis. Particularly important

TABLE 6.27HOLDERS' ATTITUDES TO CHILDREN WORKING IN AGRICULTURE

Holding Size Group (donums)	Before Consolidation		After Consolidation	
	% Holders Not Wanting Children To Work Holding	% Holders Wanting Children To Work Holding	% Holders Not Wanting Children To Work Holding	% Holders Wanting Children To Work Holding
1-2	75.0	25.0	50.0	50.0
2-5	68.3	31.7	30.1	69.9
5-10	80.6	19.4	28.3	71.7
10-20	58.1	38.7	35.5	64.5
Over 20	62.5	37.5	37.5	62.5

Source: Author's questionnaire survey

here is the stress placed on education in Cypriot society: a good education is viewed as a method of entrance into professional occupations and as an escape route from the toil and hardship associated with a traditional farming life. This factor accounts for the large number of children both still at school or in professional or service jobs, with only 1.7% of the total number of offspring working in farming. Most children, at least 60%, were still resident in the village in spite of this occupational shift across the generations into urban employment.

There are some inter-village differences in the pattern of employment of respondents' offspring. In Palechori 9% of children are involved in agriculture; this is the only village sample in which offspring involvement in farming has any real significance. Yet this sample also has the highest percentage of offspring who have moved out to urban locations - nearly a half. In Kissonerga and Khlorakas, where the average age of holders is much lower and consequently families are younger, most of the owners' children are still at school or college and so are still resident in the village.

6.4.5. Changes in Social Attitudes

As well as changes in holders' life-styles and social conditions, the consolidation process has had a direct impact on social attitudes. Some of these, such as the reaction to children continuing in or taking up agriculture, are slowly changing after consolidation. At the same time, specific attitudes towards farming are also changing. Increasingly a more modern outlook prevails. Other changes concern new farm policy initiatives which, if introduced into the rural sector, could allow agriculture to modernise more effectively in the future. In the following few pages changing attitudes are considered for the following factors: retirement from agriculture, the development of group farming and farm modernization and improvement.

For the total sample only 13% of holders operating their land wished imminently to retire from farming. Before consolidation 26.3% of operators

TABLE 6.28HOLDERS' ATTITUDES TO RETIREMENT FROM AGRICULTURE

Village	Before Consolidation		After Consolidation	
	% Wanting To Retire	% Not Wanting To Retire	% Wanting To Retire	% Not Wanting To Retire
Palechori	38	62	28	72
Kissonerga	24	76	8	92
Khlorakas	22	78	10	90
Akrounda/Phinikaria	20	80	6	94

Source: Author's questionnaire survey

had considered leaving agriculture. Closer consideration of those operators who still wished to leave farming revealed that they belonged to the smaller ownership classes (i.e. 1 - 2 donums). Thus the residue of land that may be available from the introduction of early retirement schemes would in effect be very small, although with the proper incentives perhaps more holders could be persuaded to part with their land. Generally though, while some holders may be willing to leave agriculture, they mostly still cling to their land - a result of the social and intrinsic attitudes to land ownership explored in Section 6.2.3.

When holders wishing to retire are considered by sample village, it is evident that the majority of owners considering such a policy come from the Palechori scheme (Table 6.28). This is a reflection of both the large number of small holders as well as the age of the sample in this village, with a large number of owners close to retirement anyway. In the other villages holders willing to leave agriculture are much fewer, partly because agricultural enterprises are more viable in such schemes, and partly because holders are younger.

Attitudes towards group farming do not appear to have been greatly affected by the consolidation process. Views on this controversial topic are more readily explained by respondents' political affiliations rather than any other variables. However, for the total sample there was an increase in holders willing to participate in some sort of group farming enterprise from 17.5% before consolidation to 31.0% after consolidation. When these changes are considered by holding size groups it is found that most holders wishing to enter such arrangements belonged to the larger ownership classes (i.e. 10 - 20 and more than 20 donums). This can be explained by the fact that many of these respondents are physically unable to operate their entire farm areas. Others are non-operators who feel that such an arrangement could increase their potential income from the land. For other farmers the main reasons given were increasing self-help amongst the rural community and

TABLE 6.29HOLDERS' ATTITUDES TOWARDS GROUP FARMING

Village	Before Consolidation (%)			After Consolidation (%)		
	In Favour	Unsure	Against	In	Unsure	Against
Palechori	24	2	74	24	2	74
Kissonerga	32	0	68	48	2	50
Khlorakas	2	8	90	34	2	64
Akrounda/Phinikaria	12	4	84	18	0	82

Source: Author's questionnaire survey

helping to raise incomes. Holders who were against the group farming concept maintained that such a process would create conflicts. Others has a strong personal attachment to the land and wished to work in their own fields alone.

When attitudes towards group farming are considered by village it is apparent that the most significant changes, and the development of a positive attitude towards group farming, have taken place in the Kissonerga and Khlorakas samples (Table 6.29). The main reasons for this, according to the interviews, were the ability to raise incomes and this may partly be explained by the high number of owners in the larger holding groups unable, or unwilling, to fully operate their farm enterprises. Least attitudinal change has occurred in the Akrounda/Phinikaria sample, with no change in the Palechori sample. In the latter case the dominant factor against co-operation was stated to be personal attachment to the land. In all of the last three villages mentioned peasant conservatism is still strong.

The development of a more modern attitude towards farming operations has accompanied increased labour input in the First Phase projects after land consolidation, and provides some evidence that the process has stimulated interest in the improvement of farm enterprises. Attitudes were measured using the point-score technique originally described in Chapter 2 (Section 2.4.3).

For the total sample positive attitudes towards farm modernization and improvement before consolidation were not strong (Table 6.30). In most cases the 'farm factors' used received low percentage applicability scores, with the exception of the 'farm enlargement' factor which reflected the problem of small holding sizes for operators at the time. After consolidation a more positive attitude is clearly evident (Table 6.30 again). Most farm factors have more than 60% applicability and nearly all have a high percentage importance score, indicating their perceived significance in future farming operations. Notable factors were: using more machinery, new

TABLE 6.30

ATTITUDES TO FARM MODERNIZATION BEFORE AND AFTER CONSOLIDATION

Factor Rank	Total Score	%A	%T	%I
BEFORE				
1 Enlarging farm	384	44.5	42.3	43.7
2 Using more machinery	315	38.5	34.5	36.4
3 Spending more time farming	244	27.5	23.7	26.8
4 Spending more money on farming	226	24.5	21.4	22.5
5 Attending agricultural training courses	214	21.0	19.6	20.4
6 Using new crops	204	19.0	18.4	18.0
AFTER				
1 Using more machinery	695	82.5	76.1	81.1
2 Using new crops	658	81.3	74.2	83.2
3 Enlarging farm	582	76.5	69.3	72.0
4 Spending more money on farming	515	62.0	57.4	71.4
5 Attending agricultural training courses	403	55.0	50.1	61.2
6 Spending more time farming	395	45.5	39.2	42.1

Notes: %A = percentage applicability
 %T = total percentage score
 %I = percentage importance

Source: Author's questionnaire survey

crops and spending more money farming. Least important was 'spending more time farming', perhaps indicating that holders already invest as much of their available time in farm operations as they can or want, or that the land resource base is too small to receive additional labour inputs.

For the sample villages there are slight variations in the general trend outlined above. For example, in the Palechori and Akrounda/Phinikaria samples the farm enlargement factor was the most important variable with a more than 70.0% applicability score. Contrastingly, in the Kissonerga and Khlorakas samples, the most significant farm factors in the future were 'using new crops' (85% applicability) and 'using more machinery' (80% applicability). These variations in attitude are confirmed by the relative differences in the use of extension services after the consolidation process. Kissonerga and Khlorakas had the highest number of visits with an average of more than ten per holder per year. Palechori had an average of 5.5 and Akrounda/Phinikaria only 4.8 visits per holder per year. However, in all samples, at least 70% of holders stated that they now used the extension services more frequently than they did before consolidation.

6.5. INTERRELATIONSHIPS BETWEEN SOCIAL, ECONOMIC, HOLDING STRUCTURE AND BEHAVIOURAL VARIABLES

This section considers the range of variables used in the study and investigates their interrelationships. A list of important variables can be found in Table 2.6. Two methods of analysis are used. The first involves the Kolmogorov-Smirnov Two Sample one-tailed test. This is used to examine the characteristics of pairs of variables hypothesized to be important on the basis of theoretical considerations given in Chapter 2. A worked example of the test is given in Appendix C. The second method, multiple regression, is used to provide a detailed description of interrelationships amongst a set of variables in a specified causal model. Specification of these two methods, Kolmogorov-Smirnov and multiple regression, was outlined in Chapter 4. For both techniques only statistically significant results at

the 0.05 probability level are discussed.

Attitudes towards land ownership were examined first. The dependent variable was specified as the score assigned to specific attitude questions related to either instrumental, intrinsic, expressive or social land ownership attitudes. Where there were two or more questions for each of the above groupings questions with the strongest response rates were selected as being representative. Point-scores were placed in two groups: all scores below, and including, three were assigned to a 'low group'; all scores above three were assigned to a 'high group'. A similar method was used for the farm modernization point-scores and Likert scales measuring attitudes to land consolidation. After examination of the frequency distribution of the remaining variables these were grouped in the following way:

Age (in years)	0-40; 41-45; 46-50; 51-55; 56-60; over 61.
Education (in years)	0-9; 10-11; over 12.
Labour input (in hours per day)	0-3; 4-6; 7-8; over 9.
Operated area (in donums) ...	0-1.0; 1.1-2.0; 2.1-5.0; 5.1-10.0; 10.1-20.0; over 21.
Travel time (in minutes per day)	0-5; 6-20; 21-40; over 41.
Expenditure (in £CY per year)..	0-100; 101-200; 201-300; 301-400; 401-500; over 501.
Net income (in £CY per year) ..	0-200; 201-500; 501-800; over 801.
Livestock (in goats & chickens per holder)	0-5; 6-10; 11-15; 16-20; over 21.
Debts (in £CY per year) ...	0-100; 101-200; 201-400; 401-600; over 601.
Holding structure index(in decimal points)	0-0.10; 0.11-0.20; 0.21-0.40; over 0.41.
Retirement (Yes/No)	Two groups
Group farming (Yes/No) ..	Two groups
Children farming (Yes/No) ...	Two groups

Analysis of these data along the lines exemplified in Appendix C indicates that attitudes towards land ownership are affected by a complex number of variables. For example, a high preference for economic land values is significantly related (at 0.001 level) to younger holders (below 45 years of age). Also statistically important in this relationship to economic land attitudes are education (% of holders staying at school beyond 12 years of age; significant at 0.001 level), the size of the operated area (% of holders in 2.1 - 10.0 donum class; 0.001), travelling time (holders saving 21 - 40 minutes' travelling time per day; 0.05), net income (holders in £CY500 - 800 bracket; 0.001), indebtedness (holders with debts of £CY101 - 200; 0.001), the holding structure index (Hs of 0.21 - 0.40; 0.001), group farming (0.001), positive attitudes to farm modernization (0.05) and a positive image of consolidation (favourable view of changes in plot concentration, access, shape and size; 0.001). Irrigation is not statistically significant for this group. The results are set out numerically in Table 6.31.

When intrinsic and expressive land value preferences are considered (see the middle two columns of Table 6.31), the pattern of relationships is not so complex. Age is again an important variable giving high scores on both factors, although it is this time an older age-group (56 - 60 years) which is involved. Education is also significant at the 0.001 level, picking out holders who left school before the age of nine. Other notable variables are labour input (holders working 4 - 6 hours per day), operated area (0 - 2 donums), net income (£CY201 - 500), livestock (16 - 20 animals per holder; significant only for intrinsic values) and image of consolidation (particularly the 'access' variable).

In the 'social' land ownership value column, age (41 - 50 years) and net income (£CY0 - 200) are the key variables with the highest significance levels. Other significant variables are labour input (0 - 3 hours per day), holding structure index (little change 0.0 - 0.10 points), children farming

TABLE 6.31

KOLMOGOROV-SMIRNOV TEST RESULTS: LAND OWNERSHIP VALUES

		Land Ownership Values (χ^2)			
Variables		Instrumental	Intrinsic	Expressive	Social
1	Age	27.04	18.06	17.32	19.42
2	Education	38.87	17.12	18.64	8.64
3	Labour input	2.24	27.91	16.70	7.47
4	Operated area	14.62	24.62	24.73	4.82
5	Travel time	8.36	5.61	4.27	5.64
6	Farm expenditure	4.28	5.42	3.62	2.27
7	Net income	28.02	6.45	7.64	25.41
8	Livestock	3.41	23.71	4.71	4.32
9	Debts	17.68	2.42	1.84	3.41
10	Holding structure index	24.78	3.43	4.21	6.85
11	Retirement	4.67	3.27	41.4	9.17
12	Group farming	18.24	5.54	2.89	2.34
13	Children farming	4.68	2.43	3.48	8.52
14	Farm modernity	7.21	4.42	1.72	6.47
15	Image of consolidation:				
	i) Concentration of plots	17.26	2.53	3.71	9.21
	ii) Access	19.21	14.21	14.34	6.42
	iii) Shape of Plots	22.34	14.72	1.91	8.57
	iv) Size of plots	29.47	1.22	1.14	2.13
	v) Irrigation	2.43	1.72	4.68	3.21

Note: Significant levels of $\chi^2 = 5.99$ ($p < 0.05$), 13.82 ($p < 0.001$).

Source: Based on data from author's questionnaire survey

TABLE 6.32KOLMOGOROV-SMIRNOV TEST RESULTS: IMAGE OF LAND CONSOLIDATION

Variables	Image of Land Consolidation (χ^2)				
	Concentra- tion	Access	Shape	Size	Irriga- tion
1 Age	28.84	13.64	16.51	21.47	24.28
2 Education	1.21	4.21	3.27	3.21	4.84
3 Labour input	32.47	28.26	24.61	19.61	27.21
4 Operated area	16.92	14.32	12.28	14.13	15.22
5 Travel time	17.13	18.94	19.63	21.64	19.17
6 Farm expenditure	1.42	3.42	1.69	2.23	5.47
7 Net income	5.68	1.57	3.62	3.19	7.24
8 Livestock	3.82	4.74	8.71	12.63	4.29
9 Debts	4.71	18.92	5.17	1.42	7.81
10 Holding structure index	24.63	24.67	16.72	15.74	18.92
11 Retirement	3.42	4.21	4.10	1.20	4.15
12 Group farming	2.64	7.65	5.12	4.81	5.72
13 Children farming	3.72	8.32	4.32	4.14	3.78
14 Farm modernity	1.93	9.74	2.51	5.91	10.10
15 Land values:					
i) Instrumental	18.14	22.17	22.34	31.20	2.43
ii) Intrinsic	4.28	5.12	4.72	2.21	1.72
iii) Expressive	9.71	8.31	2.95	1.19	14.68
iv) Social	14.21	12.42	2.68	4.23	7.21

Note: Significance levels of $\chi^2 = 5.99$ ($p < 0.05$), 13.82 ($p < 0.001$).

Source: Based on data from author's questionnaire survey

(holders not wanting their children to farm) and image of consolidation.

Significant variables in the perceived image of consolidation are set out in Table 6.32. Some variables are highly significant across all five parts of the image. These include age (% of holders below 40 years of age), labour input (at least seven hours of farming per day), operated area (specifically the 2 - 10 donum groups), travel time (saving of over 41 minutes per holder per day) and holding structure index (0.21 - 0.40 index points improvement). This clearly demonstrates that those with a positive image of consolidation were the younger, more active holders with medium-size holdings who had experienced marked structural improvements in their holdings. Other, less strong relationships in Table 6.32 are worth a brief mention too. Positive attitudes towards group farming and children farming are linked with only certain parts of the image, notably 'plot access'. A link between a positive image of consolidation and instrumental land values is evident, whilst negative views of consolidation characterize those with social land values.

Turning next to Table 6.33, we can examine holders' attitudes to farm modernization and the future. Statistically highly significant (at the 0.001 level) independent variables related to the 'farm modernity' point-scores include age (0 - 40 age group), labour input (4 - 6 hours per day), debts (of £CY401 - 600), image of consolidation (the 'plot concentration' factor) and instrumental land values. On the retirement column, anticipation of, or desire for, retirement is strongly associated with age (farmers over 56 years old), education (those who left school before the age of nine), operated area (below 2 donums) and net income (below £CY200 per annum). Clearly, those who want to quit farming are those who are old, poorly educated with small holdings and low incomes. A positive interest in group farming (third column in Table 6.33) is statistically related at the 0.001 level to operated area (the largest holding sizes) and at the 0.05 level to age (46 - 50 band) and change in holding structure index (of 0.11 -

TABLE 6.33

KOLMOGOROV-SMIRNOV TEST RESULTS: MODERNIZATION ATTITUDES

		Attitudes to Modernization and the future (χ^2)			
Variables		Farm Modernity	Retire- ment	Group Farming	Children
1	Age	23.21	24.83	13.71	3.82
2	Education	3.62	20.21	4.23	2.94
3	Labour input	18.74	2.43	6.42	17.42
4	Operated area	4.21	18.67	26.81	3.51
5	Travel time	6.82	7.21	4.31	4.28
6	Farm expenditure	8.21	4.44	3.45	2.34
7	Net income	18.74	15.72	2.82	3.19
8	Livestock	1.14	4.31	3.41	4.16
9	Debts	24.67	7.62	4.23	4.16
10	Holding structure index	4.72	9.50	8.94	18.86
11	Image of consolidation:				
	i) Concentration	15.68	4.41	5.62	2.91
	ii) Access	1.21	4.51	4.14	4.26
	iii) Shape of plots	4.20	1.22	5.02	7.37
	iv) Size of plots	4.50	2.10	3.11	4.19
	v) Irrigation	3.12	4.61	2.43	8.25
12	Land values:				
	i) Instrumental	16.41	1.11	2.21	6.81
	ii) Intrinsic	2.32	5.62	1.74	2.72
	iii) Expressive	1.47	2.24	5.89	5.64
	iv) Social	3.62	1.90	4.12	3.21

Note: Significance levels of $\chi^2 = 5.99$ ($p < 0.05$), 13.82 ($p < 0.001$).

Source: Based on data from author's questionnaire survey

0.20 points). Finally, interest in holders' offspring pursuing an agricultural occupation (column 4, Table 6.33) is significantly related to labour input (more than seven hours per day) and to a large change in the holding structure index of at least 0.41 index points (both relationships highly significant at 0.001 level). Less strong, but still significant, links exist with a positive image of land consolidation (especially the new shape of plots and the provision of irrigation facilities) and with owners holding instrumental land values. Holders, therefore, seeing a future in farming for their children are those who have been positively affected by consolidation (or, at least, those who see themselves as having been favourably affected) and those who already have a strong labour commitment to farming.

A more detailed investigation of the interrelationships between dependent and independent variables is possible by using multiple regression. Five variables were selected as dependent (X_0) variables and it was hypothesized that the remaining independent variables in the list would be important in explaining the value of X_0 . The list of dependent and independent variables is given in Table 6.34. A stepwise method of multiple regression was used. The hypothesized causal models are given below:

$$\begin{aligned} \text{Model 1} \quad X_0 \text{ (LABOUR INPUT)} &= X_{01} + X_{03} - X_{04} + X_{05} + X_{06} \\ &+ X_{07} + X_{08} + X_{09} + X_{10} + X_{11} \\ &+ X_{12} + X_{13} \end{aligned}$$

$$\begin{aligned} \text{Model 2} \quad X_0 \text{ (TRAVEL TIME)} &= X_{01} + X_{03} + X_{04} + X_{05} + X_{11} \\ &+ X_{13} \end{aligned}$$

$$\begin{aligned} \text{Model 3} \quad X_0 \text{ (FARM EXPENDITURE)} &= X_{01} + X_{02} + X_{03} - X_{04} + X_{05} \\ &+ X_{08} + X_{09} + X_{10} + X_{11} + X_{13} \end{aligned}$$

$$\begin{aligned} \text{Model 4} \quad X_0 \text{ (NET INCOME)} &= X_{02} + X_{03} - X_{04} + X_{05} + X_{06} \\ &+ X_{07} + X_{09} + X_{10} + X_{11} + X_{12} \\ &+ X_{13} \end{aligned}$$

$$\begin{aligned} \text{Model 5} \quad X_0 \text{ (DEBT LEVEL)} &= X_{01} + X_{02} - X_{04} + X_{05} + X_{06} \\ &+ X_{08} + X_{11} + X_{13} \end{aligned}$$

The results of this study are given in Tables 6.35, 6.36, 6.37, 6.38 and 6.39.

TABLE 6.34

VARIABLES USED IN THE MULTIPLE REGRESSION ANALYSIS

Variables	Independent	Dependent	Transformation
Holding size (donums)	X_{01}		Square root
Labour input (hours per day)	X_{02}	X_0	Raw
Education (years)	X_{03}		Raw
Age (years)	X_{04}		Raw
Operated area (donums)	X_{05}		Square root
Travel time (minutes)	X_{06}	X_0	Raw
Expenditure (₹CY)	X_{07}	X_0	Square root
Net income (₹CY)	X_{08}	X_0	Square root
Livestock (no.)	X_{09}		Raw
Debt (₹CY)	X_{10}	X_0	Square root
Farm machinery (no.)	X_{11}		Raw
Extension (no. visits)	X_{12}		Raw
Holding structure index (H_s score)	X_{13}		Raw

Source: Variables taken from questionnaire

The level of labour input after land consolidation is related to a number of variables (Table 6.35). In contrast to the hypothesized causal model, only eight variables (instead of twelve) are significant at the 0.05 rejection level. These also explain a significant amount of variance in the dependent variable. The most important variable is 'operated area' accounting for 41.9% of the explained variance in X_0 . The number of extension visits, savings in travelling time and changes in the holding structure index also account for significant, although progressively smaller, amounts of explained variance. Less important independent variables are farm machinery, farm expenditure and age. Not significant in this model, but included in the hypothesized model, were education and holding size.

When the results of the regression for savings in travelling time are considered (Table 6.36) it is evident that all the six variables included in the hypothesized model are significant. Most important in explaining savings in travel time were changes in the holding structure index (43.7%) and the size of the operated area (an increment of 7.2%). Age was also a significant variable, although this time a negative value in the regression equation suggests that lower age groups would predictably have higher labour inputs. Least significant in the model were education, farm machinery and holding size.

Farm expenditure is significantly related to eight out of the ten variables included in the third hypothesized causal model (see Table 6.37). Most significant is the level of labour input accounting for 36.2% of the explained variance in X_0 . Also important are the number of extension visits, the change in the holding structure index and savings in travelling time. Age is again given a negative sign in the regression equation suggesting that lower age groups will have higher expenditure levels. Less significant variables in the model are net income, livestock numbers and size of the operated area. Holding size and education were not significant.

In the fourth regression model, net incomes were found to be signifi-

TABLE 6.35MULTIPLE REGRESSION TEST: LABOUR INPUT

Step	Variable	R ²	% Variance	Cumulative Variance	Significance
1	05	0.4198	41.9	41.9	0.001
2	12	0.5318	11.3	53.2	0.033
3	06	0.5766	4.5	57.7	0.015
4	08	0.6101	3.3	61.0	0.006
5	13	0.6412	3.1	64.1	0.077
6	11	0.6588	1.8	65.9	0.024
7	07	0.6712	1.2	67.1	0.001
8	04	0.6804	0.9	68.0	0.003

Regression equation: $X_0 = 1.75 \text{ (constant)} + 0.82X_{05} + 0.21X_{12} + 0.16X_{06} +$
 $0.49X_{08} + 0.14X_{13} + 0.81X_{11} + 0.41X_{07} - 4.4X_{04}$

Source: Based on data from author's questionnaire

TABLE 6.36MULTIPLE REGRESSION TEST: SAVINGS IN TRAVELLING TIME

Step	Variable	R ²	% Variance	Cumulative Variance	Significance
1	13	0.4374	43.7	43.7	0.003
2	05	0.5098	7.2	50.9	0.041
3	04	0.5373	2.6	53.7	0.028
4	03	0.5544	1.7	55.4	0.047
5	11	0.5714	1.7	57.1	0.008
6	01	0.5833	1.2	58.3	0.004

Regression equation: $X_0 = 5.7(\text{constant}) + 0.2X_{13} + 0.96X_{05} - 1.8X_{04} + 0.62X_{03}$
 $+ 0.83X_{11} + 0.24X_{01}$

Source: Based on data from author's questionnaire

TABLE 6.37MULTIPLE REGRESSION TEST: FARM EXPENDITURE

Step	Variable	R ²	% Variance	Cumulative Variance	Significance
1	02	0.3624	36.2	36.2	0.046
2	12	0.3977	3.6	39.8	0.027
3	13	0.4116	2.0	41.8	0.001
4	06	0.4281	1.6	43.4	0.014
5	08	0.4415	1.3	44.7	0.032
6	04	0.4530	1.2	45.9	0.007
7	09	0.4629	1.0	46.9	0.008
8	05	0.4719	0.9	47.8	0.040

Regression equation: $X_0 = 190.18 (\text{constant}) + 1.7X_{02} + 0.57X_{12} + 0.22X_{13}$
 $+ 0.96X_{06} + 20.7X_{08} - 4.2X_{04} + 3.2X_{05} + 0.84X_{05}$

Source: Based on data from author's questionnaire

TABLE 6.38MULTIPLE REGRESSION: NET FARM INCOME

Step	Variable	R ²	% Variance	Cumulative Variance	Significance
1	02	0.4377	43.7	43.7	0.010
2	09	0.4817	4.5	48.2	0.021
3	03	0.5114	2.9	51.1	0.014
4	05	0.5314	2.0	53.1	0.003
5	01	0.5399	0.8	53.9	0.008
6	13	0.5475	0.8	54.7	0.002

Regression equation: $X_0 = 398.79 \text{ (constant)} + 0.84X_{02} + 3.71X_{09} + 0.28X_{03}$
 $+ 0.97X_{05} + 0.87X_{01} + 0.32X_{13}$

Source: Based on data from author's questionnaire

TABLE 6.39MULTIPLE REGRESSION TEST: DEBT LEVELS

Step	Variable	R ²	% Variance	Cumulative Variance	Significance
1	02	0.2802	28.0	28.0	0.004
2	11	0.3382	5.8	33.8	0.012
3	04	0.3771	3.8	37.7	0.047
4	12	0.4088	3.1	40.8	0.013

Regression equation: $X_0 = 52.41 \text{ (constant)} + 0.96X_{02} + 0.37X_{11} - 4.8X_{04} + 0.17X_{12}$

Source: Based on data from author's questionnaire

cantly related to only six of the eleven hypothesized independent variables (Table 6.38). Labour input is the most important variable, explaining 43.7% of the variance in net incomes. The number of livestock kept on the holding as well as age (again a negative relationship in the regression equation) are significant. Important, too, is the size of the operated unit. Least important in terms of the explained variance are changes in the holding structure index and the size of the holding. Variables not significant in this equation are age, travel time, expenditure, debt levels and farm machinery.

Finally, when debt levels after consolidation are considered (Table 6.39), it would appear that labour input is the key variable, explaining 28% of the variance. Debt levels, therefore, reflect and are reflected in a strong commitment to agricultural work. Also significant are the number of machines used by the farmer in his farming activities (again, this is a logical cause of indebtedness) and also the number of visits from agricultural extension officers. Once more, the regression analysis here suggests that lower age groups (step 4, variable 12) have higher debt levels.

CHAPTER SEVEN

CONCLUDING EVALUATION

This chapter discusses and evaluates the results presented in Chapters 5 and 6. The discussion focusses on the general impact of consolidation and its spatial variation. Attempts are made to isolate those variables most significant in explaining variations in response to the process. The role of land consolidation in Cypriot rural development is analysed and some disadvantages noted. Next, certain problems and difficulties of the consolidation programme first noted in Chapter 3 are re-examined and suggestions made for improvements. Finally, the future of consolidation in Cyprus, and elsewhere, is discussed.

7.1. DISCUSSION OF RESULTS

The results presented in Chapters 5 and 6 clearly demonstrate the tremendous impact that land consolidation has made on the farming communities it has affected in Cyprus. As a process of change consolidation appears to operate on three levels: for the individual or group consolidation may have important psychological effects which determine the strength or direction of any other possible changes; similarly, the economic and social life of entire village communities may be directly affected; finally, such changes have an immediate visual expression in a newly-created agrarian landscape.

All levels are of equal importance in an evaluation study, combining together in a variety of ways to determine the overall effectiveness of the consolidation programme.

Examination of the results of this investigation allow two key factors to be identified. Firstly, the effects of the consolidation process are not evenly distributed over social or geographic space. There are evident spatial differences between, and within, the sample villages - important considerations here are the characteristics of the social and physical environment of the affected villages. Secondly, the success of the consolidation process is conditioned and influenced by a number of psychological variables often directly outside the control of the implementing body, in this case the L.C.A. These are examined in more detail below.

The main elements of the behavioural investigation centred on the perceived image (and its associated learning process) and on the values towards holding land. Data relating to the latter clearly show that the land resource plays a multi-dimensional role in Cypriot society. The complex interplay of social, expressive and intrinsic values indicated that the consolidation process would have deep-rooted effects on the social structure of the communities involved. Land was viewed primarily as a means for maintaining inter and intra-family linkages, for allowing a form of self-expression and personal fulfilment and for pursuing an enjoyable working activity, i.e. farming. Less important for the total sample, but still significant for certain sub-groups, were a series of instrumental values regarding land ownership purely as a method of providing an income. These values have important implications for any government policy which attempts to interfere with, or change, land ownership patterns. Land consolidation as a process was of an almost revolutionary nature since it touched on the sanctity of land at a personal level and involved government intervention in private life, a thing previously unheard of in Cypriot society.

Consideration of the motivation behind land ownership is important in a number of respects. For example, those holders who have made a conscious decision to farm, coming to agriculture from other backgrounds, have evidently made value-judgements in favour of this occupation. Motives for such a move are varied. Some pursue primarily instrumental goals such as speculation on rising land values or hedging against inflation. Sometimes social values predominate when, for example, a rich holder seeks the status of a country land-owner or wishes to provide a rural background for his children or to retain links with a particular farm. Some engage in land-ownership in order to pursue farming activities because of the intrinsic enjoyment of such work; others see it as a means of self-fulfilment in meeting a challenge. Finally, some holders will have value-judgements about land-ownership that have been formed by the individual's environment; for example, full-time farmers are often the sons of farmers (although there are also some sons who reject these values and decide to leave farming for other occupations). Similarly, consolidation schemes which offer holders a theoretical increase in farm incomes may not be expected to arouse much response if many of those eligible are less concerned with maximising income than with making a satisfactory living in order to pursue pleasurable activities and be their own masters. In some cases some farmers may value independence too highly to relinquish control of a particular piece of land which may be, in fact, very low in monetary value.

The fundamental importance of the land resource was evidenced by the high use of information flows during the learning process - the majority of holders having adopted a wide search procedure particularly during the 'information stage'. At this time the L.C.A.'s 'enlightening' activities provided an important information source (especially through their poster campaign). Seemingly the irrationality of the fragmented farm is evident, as most holders voted in favour of consolidation. Not unexpectedly, the image of consolidation for the total sample was a positive one and had

changed only slightly after the completion of schemes, as evidenced by the voting patterns noted in the previous chapter.

Examination of the cadastral maps and the various tables in Chapter 5 clearly shows that land consolidation has had a notable effect on Cypriot holding structure. Particularly important has been the successful solution of the three major problems of the typical Cypriot holding outlined in Chapter 3 - plot fragmentation has been reduced, plot and holding sizes have increased and mixed tenure forms have virtually disappeared. The combined effect of a more rational farm structure, an increasing interest in the land and a positive response towards consolidation have led to a number of economic and social changes. Most important has been the distance-reducing effect of consolidation with subsequent savings in travelling time and increased labour input, not just in plots close to the village centre but also on the periphery. Increased farm inputs at a general level have led to changes in cropping patterns and have created a new post-consolidation landscape. This certainly is the most visually striking aspect of the consolidation process.

Land use changes have been characterized by a reduction in the uncultivated area and a decline in the more traditional cultivations such as cereals and vines, with a compensatory growth in such crops as citrus, bananas and cultivated trees. Together with the zonal shift in labour input has come an outward expansion of more intensive land uses - including the appearance of livestock units - and a clear move towards specialization. These changes have led to a rise in farm incomes and at the same time produced a feedback effect with greater farm expenditure. Although this has led to an immediate rise in household indebtedness this is only likely to be a temporary feature (as the returns from such investments are reflected in farm incomes) and is the result of a significant increase in non-land resources. Associated with these economic developments have come widespread social changes. Notable have been the movements from non-farming into the agricul-

tural sector, effectively stabilising some of the more outwardly mobile sections of the rural population. Farmstead building has been accompanied by a more general change in attitudes towards farming activities with greater interest expressed in modernization and co-operation.

Economic changes after consolidation, particularly specialization in crop types, are not unexpected if the theoretical model outlined by Johnson (1970) and described in Chapter 2 is accepted. Johnson noted that consolidation, exchange and specialization interact. A logical development of his argument is that a consolidated, rather than fragmented, holding will lead to increased specialization - since a reduction in the numbers and types of plots which have comparative advantage in producing specified crops will imply a reduction in the number of commodities produced by any individual. Also significant here is Johnson's notion of 'swapping cost'. Since the cost of swapping land in Cyprus is low due to a well developed land market, which reduces the cost of information as to the relative values of exchange, it may be expected that the magnitude of response towards consolidation will be relatively large. Similarly, since large land holding groups are not a feature of the Cypriot land tenure pattern and transport costs are relatively high, there are greater economic gains to be made from a shift towards consolidation and thus to crop specialization.

7.1.1. Differences Between and Within the Sample Projects

This overall evaluative picture painted thus far disguises, however, certain very considerable variations that do exist between, and within, individual villages. This was not unexpected and the original conception of the study consciously involved the selection of consolidation schemes from different physical environments. It was hypothesized that those environments which offered a more favourable agricultural structure would gain most benefit from the consolidation process. Surprisingly, analysis of the village results suggests that this is not the case.

For example, in the more physically unfavourable mountainous and highland regions, the positive psychological effects of consolidation are more noticeable. Here the sample holders from the Palechori and Akrounda/Phinikaria schemes had predominantly expressive and social land ownership values resulting in tremendous interest in consolidation and eventually generating a simple yet positive image of the process. Owners from the Kissonerga and Khlorakas schemes were dominated by a mixture of instrumental and social values towards land holding which may have partly conditioned responses to the process: in Khlorakas the consolidation image was complex and on balance negative; in Kissonerga complexity is still evident but the perceived image is rather more favourable. Image structure in both these villages may also have been affected by the level of structural change that consolidation was able to achieve. In the case of Khlorakas such changes appear to have been minimal, although in Kissonerga more improvement is apparent. Contrastingly, in the Palechori and Akrounda/Phinikaria projects holding structures have been radically transformed.

These differences have had effects on the extent of social and economic change. For example, in Khlorakas there were only slight changes in the level of labour input and in the size of the uncultivated area. The latter, which expanded rapidly after consolidation, has only just reached pre-consolidation levels. Similarly, land-use changes have been limited although recently there has been a move towards specialization in citrus production. Farm incomes, relatively high before consolidation in Khlorakas because of a favourable agricultural structure, have increased only slightly. At the same time social effects have been more limited with only slight changes in farmer typology and social attitudes to farming. In the Palechori and Akrounda/Phinikaria schemes economic and social change has been more profound. In Palechori there was a rapid rise in labour input and a significant change in cropping patterns, the latter becoming more specialized. Similar changes were evident in Akrounda/Phinikaria. As a result farm incomes have shot upwards in these places. This, in turn, has led to increased

rural investment, particularly in non-land farm resources, financed in the majority of cases by loans from co-operative organizations. Full-time farmers have increased in number with a strong movement back into the agricultural sector from urban occupations and living standards have risen steeply. In Palechori the development of farmsteads has rejuvenated a declining and poor agricultural region and increased the long-term viability of rural life. In Kissonerga, while economic changes are noticeable, consolidation has had rather less impact at the social level. Land use changes have been characterized by an intense movement towards specialization and a rise in farm incomes and expenditure. An important result of such developments has been an increasing modernity of outlook exemplified by the willingness to enter into group farming arrangements.

At this point it is important to try to explain the evident variations in economic, social and behavioural change between the First Phase projects. The most important considerations here are the nature of the social and physical environments of these villages. Reference back to Chapter 4 (Section 4.5) sets the scene for this discussion.

The general impact of consolidation has been most noticeable for the highland schemes at Palechori, Akrounda and Phinikaria. Highland villagers appear to form a distinctive group in Cyprus as well as in other Mediterranean countries (Davis, 1977, Ch. 2; Loizos, 1975; Peristiany, 1965 & 1968). Mountain villages are generally isolated. In such communities face-to-face relationships are extremely important and land ownership may be viewed as a common currency of relationship (Davis, 1977, p. 54). Holders may use these land rights in an 'expressive way' so that kinship and friendship become intimately linked to the land. Interest in the land, in farming and perhaps ultimately in land consolidation are thus closely woven into the social fabric of the community. Often the social evaluation of individuals, or of families, is directly related to the way in which they get access to the land - where access can be more freely obtained greater

independence is possible. In such a community people generally speaking value independence. Land consolidation, through the process of plot concentration, necessarily increases individuals' levels of independence by reducing conflicts over rights of way or access. For affected holders this new social status may create the impetus for more dynamic economic changes as it becomes possible to utilise labour to produce those labour-intensive crops which might substantially increase rural incomes. Moreover, the particularly harsh physical conditions of these upland villages and the subsistence nature of much agricultural production may have instilled a deep desire to grasp at the chance of any improvements offered.

On the other hand, social bonds in the lowland coastal schemes of Kissonerga and Khlorkas are less intense. Here, the more favourable physical structure of the region means that most villages are easily accessible and tend to have close links with each other. Both Kissonerga and Khlorkas appear to have a long history of agricultural prosperity and land holders, because of the more favourable farm structure, can lead more independent lives than in the closely congested highland villages. Land, and access to land, has less vital importance in the every-day lives of these inhabitants. As a result the introduction of land consolidation has not achieved the more radical social change that has occurred in highland projects. At the same time, the relative prosperity of the region has meant that agriculture was rarely at a purely subsistence level and the desire for agricultural change after consolidation may have been less intense. More recently tourism has offered an alternative non-agricultural source of income, again affecting the economic, social and behavioural response to consolidation.

While the preceding paragraphs have highlighted the variety of responses to, and effects of, consolidation in different schemes, it is also important to examine the effects of consolidation within individual projects. It was originally hypothesized that the benefits of consolidation would not

be evenly distributed amongst owners within the samples, with holders in larger ownership categories being more able to respond effectively to the new farm structure. Following this hypothesis, the process of consolidation could, therefore, increase existing inequalities in rural society. Such expectations were only partly fulfilled by the questionnaire results. The findings do indeed show that particular ownership classes have benefited more than others, but in general it is the smaller size groups which have experienced the most marked evolution. The most important of these appears to be the 2 - 5 and 5 - 10 donum classes. Certainly the level of structural change after consolidation was greater for these smaller classes, as reference back to Tables 5.1 to 5.11 will show. With the author's holding structure index H_s approaching unity in most cases the technical side of the consolidation policy appears to have been successful, at least for the smaller holdings. But the problems of the holding structure for the 10 - 20 donum and over 20 donum classes were not fully resolved: farms remained fragmented with large distances, on average 0.8 km., between plots. Such differences within the village samples were more noticeable for the Kissonerga and Khlorakas schemes.

Variations in structural change are reflected in differences in economic changes within the samples studied. The most significant increases in labour input occurred for the 2 - 5 donum group, whereas farm incomes rose fastest for holders from the 1 - 2 donum and 2 - 5 donum groups. Income per unit area of land declined with increasing holding size; a relationship which has been frequently noted in studies of farm size and land productivity (King, 1977, pp. 54 - 58). Higher farm inputs and expenditure per unit area of land were most noticeable for the 1 - 2 donum and 2 - 5 donum groups (both for owned and operated land). Levels of indebtedness increased most markedly for the 2 - 5 donum class, with quantities of farm machinery rising sharply.

These smaller holding groups are also characterized by higher levels

of social change, although changes in farmer typology, especially the movement from a part-time to a full-time interest in farming, are not so clear. This is a reflection of the low economic viability of many holdings, even after consolidation: they are still too small to provide an adequate income for owners. Most noticeable have been changes in place of residence, with a clear movement towards the establishment of farmsteads in the 2 - 5 donum size group in Palechori and also the change in the relative levels of material possessions for the 2 - 5 donum class. Changes in agricultural social attitude are also evident - 69.6% of holders in the 2 - 5 donum class now want their children to farm the land compared to only 31.7% before consolidation. This holding size group is also strongly polarised by a positive interest in farm modernization but a negative interest in group farming.

7.1.2. Interrelationships amongst Behavioural and Economic Variables

An understanding of the effects of the consolidation process is enhanced by an examination of the interrelationships between variables. In this study these have included behavioural, social, economic and holding structure variables. Statistical testing of the associations between pairs of variables and of variables in hypothesized causal models allows several generalizations about the impact of consolidation to be made. For example, this study has suggested that attitudes towards land ownership are an important factor in both the general success of consolidation and in the variety of response to the process. From the results presented in Chapter 6 it is possible to characterise particular attitudinal groups as follows.

Social land attitudes, which definitely dominate in the Cypriot context, generally come from middle-aged holders with children approaching marriageable age. However, interest in agricultural activity amongst this group is mainly on a part-time basis and farm incomes are modest - below £CY600 per annum. Such holders have a generally positive image of land consolidation, even though their own holding structures have not changed

dramatically with the policy.

Strong expressive and intrinsic land values characterise a much older group of holders, aged 56 - 60, with low educational levels. Such owners have a strong farming interest, but they are again part-timers - the main reason for this being the fact that their holdings, mostly in the below 2 donum class, are too small to provide full-time employment. The rearing of livestock is important for this group who have a strong positive image of consolidation.

Instrumental or economic land values are associated with much younger operators. These are full-time farmers with relatively high educational levels. Post-consolidation changes in holding structure have been particularly significant for this group resulting in considerable savings in travelling time of 20 to 40 minutes per day. The operated farm unit is relatively large and net incomes, expenditure and debt levels are high, all reflecting considerable investment in the agricultural sector. This group also has a positive image of consolidation.

For the majority of holders then, the perceived image of consolidation is a positive one. However, the strength of attitude appears to be directly related to the level of structural change after consolidation. For example, holders reporting a change in the holding structure index of 0.10 index points or less tend to have a weaker image of the consolidation process and, in some cases, a negative one. Alternatively, holders with changes in holding structure index points of 0.21, or more, generally have a strongly positive image of the process. This helps to explain the reasons for the variation of response to consolidation discussed earlier, i.e. the high level of structural difficulty before consolidation in Palechori and the success of consolidation in improving farm structure here has generated a positive image of the process. Image structure is, in turn, related to savings in travelling time after the concentration of fragmented plots and a consequent increase in

labour input (particularly associated with a shift in farmer typology, usually from a part-time to a full-time basis). Owners with an intensely positive image also tend to be the younger operators, i.e. below 45 years of age.

At a general level the consolidation process has increased interest in the land as an economic resource - this is evidenced by the large increases in labour input since consolidation. Owners most likely to generate labour input-related social and economic changes after consolidation appear from the regression analysis to be younger and 'early-middle-aged' holders below 50 years old who have relatively large operated farm units: only the larger units are capable of absorbing significant increases in labour input after consolidation. Again, time saved in travelling is statistically significantly related to increases in labour input and this variable must be considered a key element in explaining the post-consolidation development of farming.

Time saved is also statistically associated with the size of the operated area (rather than holding size); large amounts of saved travelling time are related to the larger operated farm units. This indicates that consolidation as a process may only be effective in promoting social and economic change if viable operated farm units can be created. Also important in this discussion of the causal model of labour input and its associated independent variables is the number of extension visits. A large number of visits after consolidation is associated with higher levels of farming activity.

Economic changes in consolidation schemes (specifically changes in net income, farm expenditure and debt levels) are again strongly associated with particular types of holders. Rapid increases in net income tend to characterise younger holders (below 45 years of age) with high levels of labour input associated with a notable reduction in travelling time and a significant change in farm structure after consolidation. In the causal model

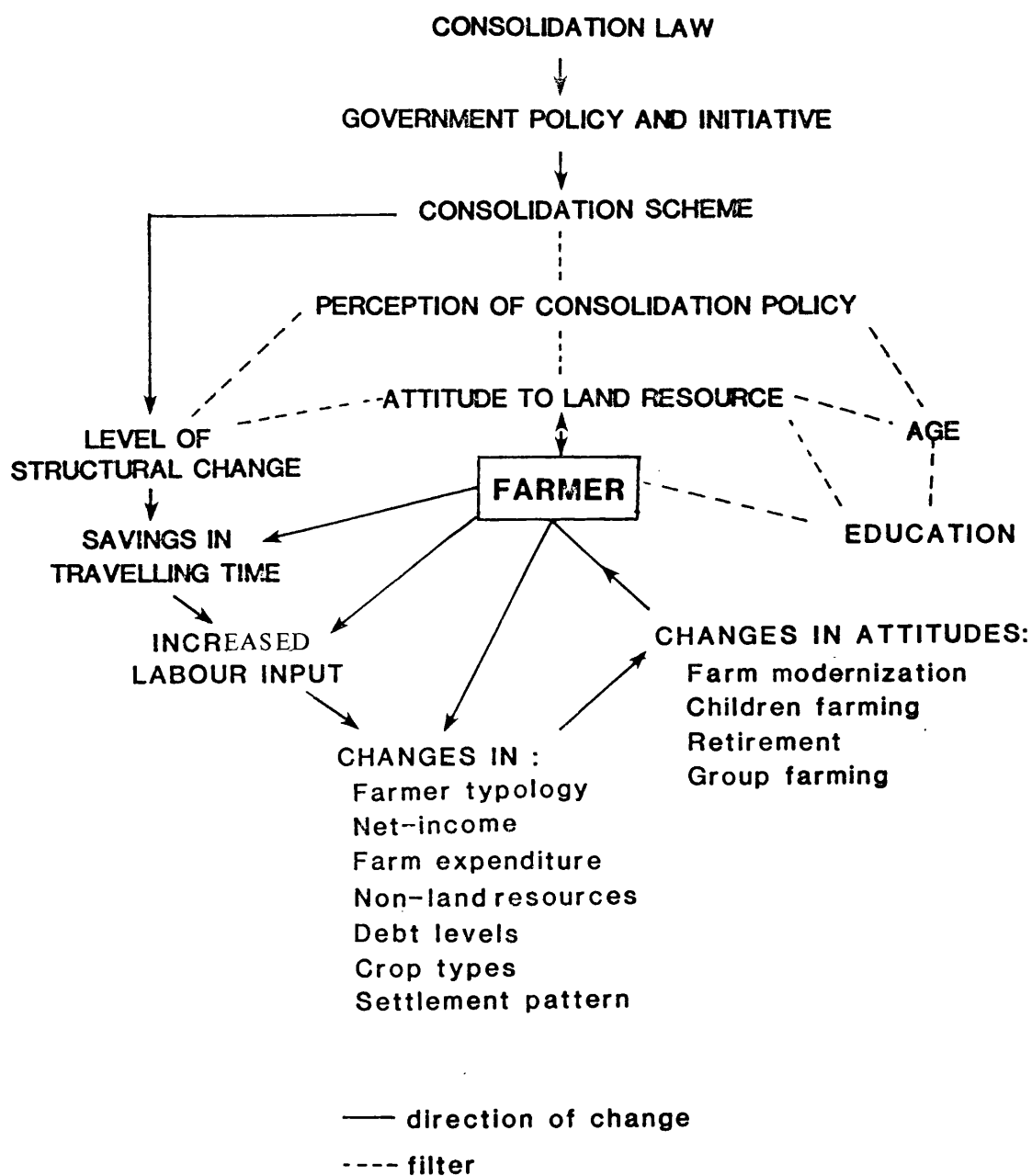
relating debt levels to independent variables, farm machinery is an important factor - indicating a positive investment in non-land resources in the agricultural sector.

Changes in behavioural attitudes towards farm modernization, retirement from agriculture, group farming and children farming are significantly related to land attitudes, image structure and changes in the ownership pattern after consolidation. From the investigation in Chapter 6 four groupings of holders can be identified. The first of these, holders with a strong desire to improve and modernise the farm, are characterised by younger operators with high levels of labour input, farm expenditure and debt levels. These owners tend to have strong instrumental land values and may be visualised as a group of progressive farmers. The second group, owners with a preference for retirement, include holders in the older age groups (61 - 65 years) with low incomes from very small holdings. For this group consolidation has done little to change the farm structure and savings in travelling time after consolidation are minimal. A third group of holders with an interest in group farming arrangements are dominated by owners with a small operated area (although the ownership area may be large) and low levels of labour input. Owners are also relatively young in the age range from 46 to 50 years and reflect a less conservative viewpoint from their older counterparts. Finally, interest in holders' offspring pursuing an agricultural activity is related to high levels of labour input, thereby characterising a group of full-time operators who have a positive image of consolidation and have enjoyed significant change in farm structure with consolidation. These owners also have predominantly instrumental land values.

7.1.3. A Model of the Impact of Land Consolidation

From the preceding discussion of the effects of consolidation in the Cypriot context, it is possible to develop a theoretical model of the impact of the land consolidation process (see Figure 7.1).

FIGURE 7.1 MODEL OF THE IMPACT OF LAND CONSOLIDATION



At a simple cartographic level consolidation changes the pattern of land ownership and improves the structure of individual farm units. However, the impact of consolidation on the social and economic life of the affected communities is related to the perception of the policy which is, in turn, affected by the levels of structural change. The image of consolidation is the product of a variety of filters directly associated with attitudes to land ownership and the use of information sources. These filters are dependent upon a number of social and economic variables including age, education and farmer typology. A key element in the impact of consolidation at the individual farm level is the saving of travelling time, resulting from the distance-reducing effect of plot concentration. Saved time is invested in increased labour input with consequent change in farmer typology, net farm incomes, farm expenditure, non-land resources and debt levels. These, in turn, have an impact on farmers' perceptions of farm modernization, group farming, retirement from agriculture and children farming. Change in such behavioural attitudes may have a feedback effect on the farmer and the rural community with changes in cropping patterns and perhaps the appearance of farm buildings in the agrarian landscape.

7.2. LAND CONSOLIDATION AND CYPRIOT RURAL DEVELOPMENT

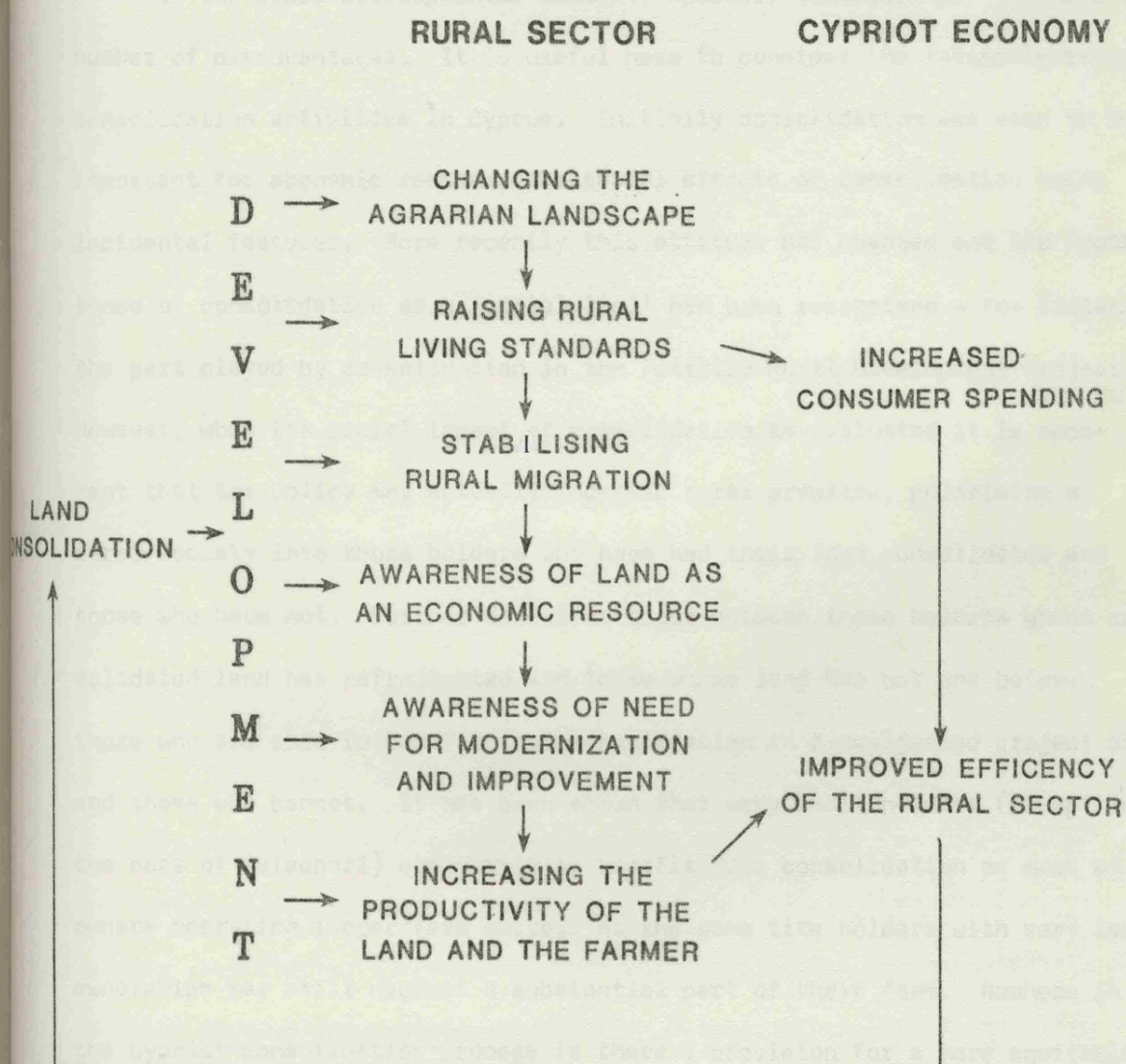
Farming remains the backbone of the modern economy of Cyprus and most Cypriots are involved, in some way, with agriculture. In development terms this has meant that changes in the economy are closely linked to changes in the rural sector. The latter has, over the last 20 years, attracted a vast amount of developmental expenditure from the larger aid organizations. Projects in rural Cyprus are numerous (see Chapter 3) although there is now a tendency for a more integrated approach to development. To date, land consolidation has played an important role in some development schemes. This contrasts strongly with many other countries, especially those in North-west Europe, where consolidation activities per se no longer appear to be a live issue in overall agricultural development. Within Cypriot government

departments land consolidation is certainly seen as a vital developmental device.

Yet land consolidation has, in fact, affected only a very small part of the rural area of Cyprus. The vast majority of agricultural land remains in a fragmented state despite the large investment in consolidation activities. The benefits of consolidation discussed in the previous section are thus confined to a small percentage of the agricultural population. These are serious limitations. Another big problem is the slowness of a policy which only tackles a handful of villages each year. Nevertheless, consolidation is still perceived, not least by the staff involved, as a powerful instrument for reconstructing the rural economy.

The developmental impact of consolidation is summarised diagrammatically in Figure 7.2. The benefits of consolidation in developmental terms may be grouped under three headings: social, economic and behavioural. In rural development the most important of these is most likely to be the economic factor (in Figure 7.2 this is the box labelled 'Increasing productivity of the land and the farmer'). Such changes in the rural sector have an immediate impact on the economy as a whole - increasing the level of agricultural exports (and so improving the balance of payments) as well as raising the level of consumption in the rural sector. Consolidation may also provide a basis for future improvements in the agricultural sector since re-consolidation, where it is needed to meet the demands of changes in production technology, is much easier. Social reasons may be less important in the developmental argument although they are a significant feature of consolidation in Cyprus. Important social factors are: the raising of the rural standard of living, the removal of the waste of time and energy associated with a fragmented structure and the stabilization of a rural population which, before consolidation, had a high propensity for migration and the abandonment of rural land. Finally, in the proposed developmental model, consolidation has important behavioural effects which may act as a catalyst

FIGURE 7.2 THE DEVELOPMENTAL IMPACT OF LAND CONSOLIDATION



for future development programmes, or even foster peasant self-development. Farmers in Cyprus are now more aware that the land they farm is an economic resource and that a fragmented farm structure increases farming difficulties. No longer do they just accept fragmentation as a 'way of life'. Consolidation may result in the development of a more modern outlook and help to overcome the negative attitudes towards change associated with the traditionally conservative peasant.

In the wider developmental context, however, consolidation may have a number of disadvantages. It is useful here to consider the rationale behind consolidation activities in Cyprus. Initially consolidation was seen to be important for economic reasons, the social effects of consolidation being incidental features. More recently this attitude has changed and the importance of consolidation as a 'social tool' has been recognised - for instance, the part played by consolidation in the Pitsilia Rural Development Project. However, when the social impact of consolidation is evaluated it is apparent that the policy may actually increase rural problems, polarising a rural society into those holders who have had their land consolidated and those who have not. Further divisions occur between those holders whose consolidated land has refragmented and these whose land has not and between those who are able to benefit from consolidation in a designated project area and those who cannot. It has been shown that very small holders (except in the case of Palechori) are unable to benefit from consolidation as much as owners operating larger farm units. At the same time holders with very large ownerships may still neglect a substantial part of their farm. Nowhere in the Cypriot consolidation process is there a provision for a more equitable land distribution. Perhaps the incorporation of some kind of 'mini-land reform' in the consolidation procedure may overcome this problem.

Furthermore, consolidation alone can only have a limited effect on the development of rural Cyprus. At present all the programme does is to provide the holder with an improved farm structure that can be used - or not! There

is no active, integrated participation by other government agencies after consolidation, showing the farmers for example how the new farm structure can be efficiently used. Indeed it is assumed that the farmer knows how to use the new field system although he may be accustomed to organising his life around a fragmented farm structure. Similarly, the imposition of consolidation policy in Cyprus tends to ignore the rationality aspect of some fragmented farm structures. No provision is made within existing consolidation procedures to explore whether the fragmented farm structure is economically more efficient (for reasons such as flooding, disease, production conditions, etc.).

Finally, there is the question of value judgements in the developmental issue. There is a tendency to assume that a consolidated farm structure will benefit the farmer without pointing out that the State is perhaps a major benefactor in the entire process - forcing the peasant to undergo a radical change in his way of life in order to improve the structure of the agricultural economy for essentially capitalistic ends. This may be a reason why the 'redistribution' aspect of consolidation activities has been ignored. Generally, though, this argument is rather weak, since it has been established that the farmer is a major benefactor of the policy of consolidation.

Future development policy in Cyprus continues, for the time being, to see consolidation as an important element. The planned Southern Conveyor Project (see Chapter 3, Section 3.5.3) will necessitate the consolidation of large areas of land along the southern coastline. However, the suitability of existing consolidation procedures in the longer term is questionable. This theme is explored further in the next section.

7.3. PROBLEMS AND DIFFICULTIES OF CONSOLIDATION IN CYPRUS

At the end of Chapter 3 (Section 3.6.5) some of the problems associated with the policy of land consolidation in Cyprus were briefly discussed.

Some of these issues can now be discussed in more depth, in the light of the farmers' views as revealed in the questionnaire responses and through a series of interviews conducted by the author with key personnel in Nicosia and elsewhere. Three main groups of problems can be identified - institutional, social and economic.

As an institution the L.C.A.s structure and promotion of the consolidation process suffer from a number of problems which affect its efficient working. During many of the 'stages' of consolidation the L.C.A. has to rely on other departments. Often the delays involved in such inter-departmental dealings and the unfamiliarity of other departments' staff with consolidation procedures hamper progress. For example, responsibility for the preparation of an initial land register and the drawing up of new ownership certificates and cadastral maps is invested with the Lands and Surveys Department, who find themselves swamped with normal land dealings. Consequently, they can only allot a small amount of staff time to the L.C.A.'s requests. At the same period many of the L.C.A.'s technical staff may be underemployed. A greater degree of integration is needed or a change in the role of the Lands and Surveys Department during such critical stages.

Much of the complexity of the consolidation process and the necessary inter-departmental co-operation are the by-products of a complicated consolidation law which contains the views of a wide number of interested parties. Dr. Demetrios Christodoulou, the father-figure of land consolidation in Cyprus, has argued that efficient consolidation can only come about by a simplification of the law itself (Christodoulou, 1980). However, such a streamlining of the legal structure is unlikely given the nature of Cypriot society where individuality is controlled by a series of 'client paternalist' relationships (Loizos, 1975). An alternative approach could be to use the existing law to attempt more limited consolidation, perhaps in the style and spirit of the French SAFERs. Such accelerated measures may also allow for the benefits of consolidation to be more widely dispersed. Another method

which could be used is the promotion of consolidation through group farming - an approach which this study has shown to be viable. Faster consolidation would lead to savings in time and in costs and may encourage more operators to accept the initial concept.

A problem of a more serious nature within the L.C.A. is the lack of any evaluative or interactive work with operators after consolidation. While such an absence prompted this piece of research greater responsibility must be taken by the L.C.A. in the future. Not only will this ensure a more flexible and realistic consolidation process it will also provide a definite and continuing link between the service's personnel and the affected operators.

There are also social problems connected with the consolidation process. By its very nature consolidation is incompatible with regulatory mechanisms enshrined in Cypriot life. One such mechanism is the land inheritance system. As noted earlier, this is based upon equal rights to land of equal value, which often results in the irrational fragmentation of property over time. Consolidated areas are becoming rapidly re-fragmented. At the same time the consolidation law imposes constraints on the number and types of sub-divisions that can occur with far-reaching implications for the social life of the communities involved. At another level consolidation may interfere with the workings of the dowry system. Since most marriages are influenced by the parents, with the advice and encouragement of the close family, the father accepts responsibility for the future happiness of his daughters. Following the custom of other Mediterranean societies, this acceptance of responsibility is manifested as the 'dowry' given to every daughter on marriage. This is, at the same time as being a simple gift, a method of passing on property from one generation to the next, with the girl initially bringing the possessions into her new family (Lee, 1973, p. 104). The provision of a dowry, which now usually involves the purchase of a plot of land and the building of a house, is an expensive business. Often land

is sold to provide money for such purposes.

The rigidity and inflexibility of the consolidation process are clearly evident when a holder wishes to re-distribute his ownership. An application for sub-division must be made in writing to the Lands and Surveys Department and each case is individually investigated within the terms of the consolidation law. The law places fixed parameters on the size of units that must exist within a consolidation area and also states that all units must have access to farm roads. When holdings are of an irregular shape, for example in mountain areas, such criteria mean that 'normal' inheritance is impossible. One holder in Palechori was unable to divide his 12 donums equally between his four children because only two plots with road access could be created from his existing ownership. The resulting inheritance pattern led to family quarrels and social tension in the whole community. The family was split in two groups: one patronised one coffee-shop and the other another. Although the same farmer had made repeated pleas to the L.C.A. to reconsider his particular case, nothing was done. In such a situation a more comprehensive policy of advice and financial assistance by the L.C.A. during the inheritance stage would facilitate such transactions.

The refragmentation problem also has important economic considerations for the long-term viability of consolidation programmes. Refragmentation can take place in two ways: land may be sub-divided through sale or through donation (usually during inheritance). As a process it can operate in three ways: the ownership may be split but no new plots created, the whole ownership or a single plot may be partly affected and the ownership and individual plots are sub-divided with the creation of new fragments. Refragmentation which leads to an increase in the number of owners but not in the number of plots may be less damaging in the long-term than that which physically splits plots.

Whilst the L.C.A. has generally accepted that some reconsolidation will eventually have to take place in most project areas, the authority has tended

TABLE 7.1REFRAGMENTATION OF CONSOLIDATED LAND 1976-79 FOR SAMPLE OF HOLDERS

	Palechori (n = 50)	Kissonerga (n = 50)	Khlorakas (n = 50)	Akrounda/ Phinikaria (n = 50)
No. of owners, 1976	57	58	61	53
No. of owners, 1979	75	89	88	74
% land sold	24.5	84.6	27.3	23.7
% land donated	75.5	15.4	72.7	76.3
No. of affected holdings	47	31	28	33
No. of new plots	10	3	2	13
New owners' residence:				
% village	37.1	0.0	77.8	20.1
% nearby villages	10.4	0.0	2.2	15.4
% town	59.5	100.0	20.0	64.5

Source: Lands and Surveys Department, Nicosia

to underestimate the rapidity with which newly consolidated areas are actually refragmenting. Data collected for the samples of holders from the First Phase projects show that the number of owners between 1974 and 1979 has risen by 61% from 200 to 326. The rate of refragmentation also varies spatially, being most intense in the mountain and highland villages of Akrounda/Phinikaria and Palechori (Table 7.1). The large number of new plots appearing in these project areas is a reflection of the small size of holding, irregular shape and variable land quality. In most of the cases recorded land has been sub-divided as a result of inheritance (donation) although in Kissonerga land sales to developers and speculators dominate.

Refragmentation has had a negative effect on the economic viability of the consolidated units many of which were originally of questionable economic viability anyway. Mean holding size has fallen from 2.7 to 1.8 donums, and mean plot size from 1.6 to 0.9 donums. These reductions have been even more rapid in highland villages. Significantly a large proportion of the new owners who have emerged through refragmentation have an urban location and, in the case of Kissonerga, land has been effectively taken out of agriculture. In the other villages the new owners only visit their plots on a part-time basis, or not at all, leading to a partial cultivation of the land or a change towards a less intensive cropping. This places a big question-mark over the long-term value of the consolidation process.

Land consolidation in Cyprus involves a tremendous investment in terms of time and money. In order to justify its continuing expenditure on various schemes it should be evident to the Cyprus Government that the policy has some cost-effectiveness. In this study cost-effectiveness is measured by the increase in average net income per donum; however, it must be recognised that there are other benefits which cannot be quantified (e.g. social and psychological improvements). Table 7.2 suggests that only three of the five sample schemes are cost-effective in the terms defined above. These are Palechori, Akrounda and Phinikaria, the latter two being considered together

TABLE 7.2COST-BENEFIT ANALYSIS OF LAND CONSOLIDATION IN CYPRUS

Village	Increase in net income after consolidation (£CY/donum)	Cost of consolidation (£CY/donum)	Cost- benefit ratio
Palechori	44.96	26.07	1.7
Kissonerga	6.95	20.27	0.3
Khlorakas	8.92	16.87	0.5
Akrounda/Phinikaria	42.59	36.28	1.2

Source: Author's questionnaire survey

for the sampling purposes of this research. These three villages were also the most expensive to consolidate. Kissonerga and Khlorakas, with much lower costs, are not cost-effective at this moment in time (although it must be remembered that in the future as new plantations mature and output increases, they may become so). These results suggest that greater care must be taken by the consolidation authority in selecting areas for consolidation - it is not always those schemes with the lowest costs that will produce the most significant results.

7.4. THE FUTURE

Land consolidation, in spite of its high costs, looks to be an important feature of future development in rural Cyprus. There are several reasons for this. Firstly, the consolidation experiments of the early 1970s have been a success. Valuable experience has been gained and new techniques, skills and approaches developed. That consolidation is perceived to have had positive effects is important, despite a general lack of evaluative work. In the context of this study the process has been shown to have done much to improve the social and economic life of the affected villages.

Secondly, the consolidating authority, the L.C.A., has become well-established bureaucratically and organizationally. The head of the authority and his staff have assumed a responsible position in the administrative machinery of the country. The department continues to expand annually in terms both of the budget it receives and of staff numbers. What was a little-known authority ten years ago is rapidly becoming an accepted name in rural areas, and the consolidation official with his cadastral plans and ranging poles, an established feature of rural life.

Thirdly, the large number of projects existing, under preparation, planned and under investigation indicate that much land will be consolidated in the fairly short-term. In the longer term the problems of refragmentation may mean that the consolidating authority is unlikely to achieve a compre-

hensive consolidated landscape and will, instead, pursue a dynamic policy with no foreseeable end.

On the other hand, there are certain problems and difficulties with the consolidation process in Cyprus that may require a more radical transformation of its present structure and procedure. In the last section a number of suggestions for new approaches were made. As the increasing effects of a world recession reduce the amount of international aid for development and necessitate a reduction in Cypriot government expenditure it may be expected that less costly methods of farm re-organization may be attempted (for instance, along the lines of the SAFER in France). Moreover, conceptualization of the scale of the fragmentation/consolidation/development problem may require the establishment of a new organization orientated towards a more integrated approach to structural change: the 'Department of Agrarian Structure' may be a suitable name for such an organ.

Finally, there are two major problems which seriously question the viability of consolidation activities in Cyprus. The first of these is the refragmentation question. While refragmentation may, theoretically, give the L.C.A. a job that can never be completed, if the present rapid rate of refragmentation continues then the cost-effectiveness of the whole process is questionable. What is needed is a more radical change in the prevailing social structures that influence dealings in land. Secondly, if prevailing attitudes towards agricultural activity persist (i.e. that it belongs to a peasant generation that each and every peasant is trying to escape from) then the viability of future agricultural operations must also be questioned. Indeed, the poor response to holders' offspring being actively encouraged to operate their parental ownership, the rise of part-time and hobby farmers and the movement from village to town all indicate that a re-evaluation of the future role of agriculture in Cyprus must be carried out. Steps may then be taken to actively encourage younger holders

to operate their land on a full-time basis and to revitalise interest in farming.

In concluding this discussion it must not be forgotten that the Cypriot consolidation programme is the only comprehensive policy of structural change existing in the eastern Mediterranean. In this context, the programme has done much, by example, to show other countries and agencies that re-organization of ownership patterns and improvements in production potential are possibilities for areas where land fragmentation is a problem. Indeed, greater publicity of the Cypriot programme may make it a model for such developments.

7.5. CONCLUDING SUMMARY

This study has examined the features of land fragmentation and land consolidation and has argued that both are essentially spatial concepts which have not been fully analysed by geographers. Fragmentation data, from a wide variety of sources, have been considered and shown to be an important aspect of farm structure in many parts of the world. A fragmented farm structure was defined as one in which an individual's farms or operational holdings are split into many dispersed parcels. Often this results through the operation of the inheritance laws in a situation of rapid population growth, but fragmentation can have an ecological rationale in a peasant subsistence economy where land types are mixed and the farming environment is hazardous. Although fragmentation is commonly associated with backward peasant farming, the phenomenon is, in fact, more serious in Europe than in the Third World. Advanced European countries like Sweden, Denmark, Germany, France and Switzerland have been consolidating their land for decades. The problems of fragmentation today remain particularly severe for southern European and Mediterranean countries like Portugal, Greece, Turkey and Cyprus.

An investigation of consolidation operations revealed some general

principles, but also wide differences in conception and practice between countries. The theoretical benefits of consolidation, particularly from a geographical perspective, were examined in detail. Problem areas of consolidation evaluation were identified and areas which deserve further research outlined. It was suggested that the use of more rigorous and analytical measuring techniques would give evaluation studies sharper definition and allow better comparison between the experiences of different countries and regions. In this evaluative study a wide range of methodological approaches was adopted. These included cartographic, economic, social and behavioural perspectives.

Cyprus was selected for a number of reasons, as a suitable area for the implementation of an evaluative study. In this particular country the land tenure structure was characterized by three major problems which hampered efficient farming operations. Fragmentation data for Cyprus were examined, drawing especially on the 1946 and 1977 Agricultural Censuses. Fragmentation was shown to be the result of an intense interest in the land resource combined with the practice of partible inheritance. The main attempt to deal with the problems was the Cypriot Consolidation Law of 1969. Using a sample of 200 holders from the five First Phase consolidation projects, an evaluation of the impact of land consolidation, using a 'before and after' approach, was attempted. At the same time a comparative analysis of changes in holding structure and land-uses in the five schemes was carried out.

The results of these investigations indicated that land consolidation had done much to transform agrarian life in the affected villages. At a general level there had been a positive response to the process as evidenced by the perceived image and the pre-consolidation voting patterns. Cartographic and statistical analysis of the changes in farm structure suggested that consolidation had been particularly successful in reducing the three major problems of Cypriot land ownership. Social change in consolidated

areas was apparent with a rapid increase in farming activities, mostly due to the savings in travelling time post-consolidation. Other changes included an increase in the rural standard of living and the development of farmsteads - a new feature in the agrarian landscape of Cyprus. New inputs in the agricultural sector brought rapid economic change to consolidated areas - new cropping patterns, livestock units and specialization at the farm level were all apparent. Investment in the new land resource was extensive and real net farm incomes were higher per owner and per operator after consolidation. An important contributing factor in these developments was the provision of new irrigation facilities. Land consolidation also had an effect at the psychological level resulting in changing attitudes to farm modernization, group farming, children farming and retirement from agriculture. Overall, there appeared to be a new interest and initiative in the farming sector. From these observations it was possible to accept the original hypothesis that land consolidation would lead to a modernization and improvement in production levels for the agricultural community.

The impact of consolidation was also seen to vary spatially - between and within the First Phase villages. Some results were surprising. Villages in poorer regions with very disadvantageous farm structures before consolidation appeared to have experienced the greatest social and economic change after consolidation. This was confirmed by statistical testing which showed a high association between a positive consolidation image and big changes in the holding structure index. Similarly, within the projects considered, instead of the larger holding groups benefiting most from the process it was the smaller and medium classes which showed the greatest propensity for change.

Using various statistical testing techniques it was possible to characterize particular groups of holders and examine the effects of a wide range of variables on the changes that occurred. Age of holders was identified as an important variable in most of the analyses - demonstrating that a

younger to middle-aged group of owners was the most active in transforming life in the consolidated villages. In this respect attitudes and variables towards land ownership were particularly important in conditioning the response to the consolidation process. Social values were predominant although instrumental values tended to characterize a group where economic change was significant. In the future the pre-selection of suitable groups from suitable geographical areas may create a wider acceptability and success rate for the programme.

However, the consolidation process in Cyprus cannot solve all the difficulties of the agricultural sector although its significance as a 'model' for other Mediterranean countries was noted. The technique has some distinct problems and disadvantages. Some of these may be overcome by changes in the way that consolidation is carried out. It was, for example, proposed that a new approach saving time and money, may be to adopt the French SAFER method of consolidation, aimed at an accelerated procedure. Similarly, changes in the law and in departmental and inter-departmental organization, may facilitate more efficient consolidation. Alternatively, a new department concentrating on an integrated approach may provide a more adequate framework for land consolidation in the future. A more fundamental problem concerns the refragmentation of consolidated land which, if not stopped, threatens the viability of the whole programme. However, intervention in land dealings, which are inextricably bound up with the regulation of social life in Cyprus, is a particularly sensitive area requiring some sort of radical change in social values. Any such change is necessarily a politically touchy area which has, to date, been avoided. Yet not to tackle this issue would be to negate the good work of the L.C.A. in Cyprus.

APPENDIX ASTAGES FOR THE IMPLEMENTATION OF A LAND CONSOLIDATION SCHEME
IN CYPRUSA. PRELIMINARY

1. Identification of a scheme.
2. Survey of the area.
3. Meetings with owners.
4. Land use and land ownership surveys.
5. Lectures.
6. Collection of signatures.
7. Feasibility study. Decision by the Authority.
8. Arrangements with D.O. for the preliminary meeting.
9. Preliminary meeting. Decision. Election of Committee Members.
10. Procedure for the appointment of Government members.
11. Study for the definition of the area to be consolidated.
12. Definition of the area.
13. Request for lists of owners.
14. Preparation of lists of owners. Checking. Xeroxing of the lists.
15. Publication of the lists. Objections. Examination of objections.
Final publication of the lists.
16. Arrangements with D.O. for the first meeting of owners.
17. Voting procedure.
18. Results of voting. Checking. Report by D.O. Publication in the Gazette.

B. PRACTICAL

1. Computation of the areas of plots. Corrections.
2. Procedure for the appointment of Government members and the election of owner members to the L.C. and the Valuation Committees.
3. Leasing of premises.
4. Procedure for the preparation of:-

- photogrammetric and contour maps.
 - geological map.
 - soil map.
 - up-to-date cadastral plan.
5. Demarcation of the area.
 6. Establishment of a triangulation network. Completion and correction of the photogrammetric map.
 7. Transfers of ownerships.
 8. Valuations. Field work.
 9. Valuations. Preparation of lists.
 10. Publication of Valuation lists. Objections. Examination. Revision of lists. Final publication.
 11. Preparation of map with land utilization zones.
 12. Identification of leases, mortgages, easements and rights.
 13. Procedure for the approval for land consolidation
 - hali land
 - church land
 14. Applications for the sale of land.
 15. Land valuations map.
 16. List of owners and value of properties.
 17. List of cultivators.
 18. Publication of items 15-17. Objections. Revision. Final publication.
 19. Applications for the purchase of land.
 20. Exemptions of ownerships.
 21. Definition of economically viable holding.
 22. Preference sessions.
 23. Procedures and decisions with regard to the following:-
 - purchase of land
 - allocation of extra land
 - small-medium-large holding. Exemptions to this rule.
 - compulsory acquisitions.
 - allocation of land to certain ownerships which otherwise would have to be acquired.
 - decisions with regard to owners owning only one plot, or a plot on a main road, or near the village, or permanent plantation, or having permanent structures on their plots.
 - compulsory increases or decreases on the value of properties.

- establishment of rights, easements, a.s.o.

24. Land redistribution plan.
25. Study of the new road network. Detailed designs. Bills of Quantities. Costing.
26. Study for the landscape renovation plan.
27. Demarcation of the centre axis of the roads.
28. Procedure for compulsory acquisitions outside the area.
29. Publication of the road network plan. Objections. Examination and decisions by the Committee.
30. Examination of objections, and decisions by the Authority.
31. Procedure for the issue of a license for the construction of the roads.
32. Procedure for tenders. Award of tenders. Signing of contracts.
33. Procedure for dedagging of funds and for loans.
34. Construction. Supervision. Completion. Acceptance of roads.
35. Survey of the road network.
36. Procedure for certificate of acceptance of the roads.
37. Demarcation and Survey of the land redistribution plan.
38. Publication of the land redistribution plan. Objections. Examination of objections by the Committee. Decisions. Preparation of minutes. Revision of the plan. Second publication.
39. Appeals to the Authority. Examination and decision by the Authority. Revision of the plans.
40. Assumption of possession.
41. Final survey of the D.L.S. Computation of areas and values.
42. Issuing of title deeds. Award of titles.

C. FOLLOW-UP

1. Procedure for the payment of dues to owners.
2. Procedure for the approval of the Rules of the Committee.
3. Procedure for charging the owners for extra land.
4. Procedure for the allocation of land which remained unallocated.
5. Procedure for charging the owners for the costs of roads.
6. Maintenance of roads.
7. Subdivisions of plots.

APPENDIX BTHE INTERVIEW SCHEDULE(ORIGINAL IN GREEK)

1. How long have you lived in the village/the farmstead/Nicosia, Paphos or Limassol? (cross out the irrelevant parts)

_____ number of years.

If you have lived in the village/farmstead/Nicosia, Paphos or Limassol (cross out irrelevant parts) less than seven years, where did you live before?

_____, For how long? _____ number of years.

2. Are you a: Full-time farmer ☐ Tick the correct
or Part-time farmer ☐ box.
or Non-farmer ☐

3. Before land consolidation were you a:

Full-time farmer ☐ Tick the correct
or Part-time farmer ☐ box.
or Non-farmer ☐

4. If you are a part-time farmer or a non-farmer what is your other occupation? _____

Was it the same before land consolidation? YES ☐ NO ☐

If NO, what was your other occupation? _____

5. (a) How many hours did you spend farming today? _____ hours

How many hours did you spend farming yesterday? _____ hours

Does the time that you spend farming vary much over the year?

YES ☐ NO ☐

If YES, what is the longest time spent farming? _____ hours.

and at which time of year? _____ (season).

5. (cont'd)

What is the shortest time spent farming? _____ hours, and at which time of year? _____ (season).

If you were a full or part-time farmer before land consolidation, what was the longest time spent farming? (If you cannot remember go to (b)) _____ hours, and at which time of year? _____ (season).

(b) Was the amount of time spent farming before land consolidation, at similar times of year and on similar days:

more ☐ less ☐ or the same? ☐ Tick correct box.

6. How long have you been a farmer? _____ years.

7. How old were you when you left school? _____ years.

Have you taken any courses since leaving school? YES ☐ NO ☐

If YES, give details: Length of course _____

Place of Study _____

Qualifications _____

8. Do you possess any of the following now?

	NOW		BEFORE CONSOLIDATION
Van/pick-up/land-rover	<input type="checkbox"/>		<input type="checkbox"/>
Car	<input type="checkbox"/>		<input type="checkbox"/>
Motorcycle	<input type="checkbox"/>	Tick The Correct boxes	<input type="checkbox"/>
Bicycle	<input type="checkbox"/>		<input type="checkbox"/>
Horse/donkey	<input type="checkbox"/>		<input type="checkbox"/>
Tractor	<input type="checkbox"/>		<input type="checkbox"/>
Mobile rotavator	<input type="checkbox"/>		<input type="checkbox"/>

Did you possess any of the following before land consolidation?
(use the boxes above)

9. Are you married? YES ☐ NO ☐

Do you have any children? YES ☐ NO ☐

If YES, list their ages, sex, occupation and place of residence:

Child	Residence	Sex	Age	Occupation
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				

10. Do members of your household, or any other relations work on your farm? YES ☐ NO ☐

If YES, who are they? _____,

Do they work full-time ☐ or part-time ☐ (tick correct box).

Is the amount of family help on the farm: more ☐ , less ☐ ,
or the same ☐ as that received before land consolidation?
(tick correct box).

11. Do you hire any labourers from outside the family to work on your land? YES ☐ NO ☐

If YES, how many do you hire? _____

For how many weeks per year? _____

And at what time of year? _____ (season).

12. Did you hire any labourers from outside the family to work on your farm before land consolidation? YES ☐ NO ☐
 Compared to the situation now, was the amount: more ☐ ,
 less ☐ , or the same? ☐ (tick correct box).

13. How old are you? _____ (years).

14. What is the size of the uncultivated area of your farm?

_____ (donums).

What was the size of the uncultivated area before land consolidation?

_____ (donums).

(If respondent cannot answer, ask if this was bigger ☐ ,

smaller ☐ , or the same ☐ and tick the correct box).

Does your wife/husband or children own land in the land consolidation

area? YES ☐ NO ☐

If YES, how much? _____ (donums).

Do you cultivate this land together? YES ☐ NO ☐

15. How much land do you rent out to others now? _____ (donums).

How many plots? _____

How much land did you rent out before land consolidation?

_____ (donums).

How many plots? _____

(If respondent cannot answer, ask if this was more ☐ ,

less ☐ , or the same ☐ and tick the correct box).

16. How much land do you rent in from others now? _____ (donums)

How many plots? _____

How much land did you rent in from others before land consolidation?

_____ (donums).

16. (cont'd)

How many plots? _____

(If respondent cannot answer, ask if this was more ☐ , less ☐
or the same ☐ and tick the correct box).

17. How long does it take you to reach your most distant plot now?

_____ (minutes).

How do you travel? _____

How long did it take you to reach your most distant plot before land
consolidation? _____ (minutes)

How did you travel? _____

(If respondent cannot answer in minutes ask if it was more ☐
less ☐ or the same ☐ and tick the correct box).

18. How long does it take you now to reach your nearest plot?

_____ (minutes).

How do you travel? _____

How long did it take you to reach your nearest plot before land
consolidation? _____ (minutes)

How did you travel? _____

(If respondent cannot answer in minutes, ask if it was more ☐
less ☐ or the same ☐ and tick the correct box).

19. Do you feel that land consolidation has saved you time travelling from
your house to your fields? YES ☐ NO ☐

If YES, how many minutes per working day are saved?

_____ (minutes).

Do you use this saved time cultivating your fields? YES ☐ NO ☐

If NO, how do you use this time? _____

20. Please list the crops that you grow now and the livestock that you own:

Crop	Area (donums)	Number of Plots
i)		
ii)		
iii)		
iv)		

Number of livestock? _____ Type? _____

Please list the crops that you grew before land consolidation if you were a farmer:

Crop	Area (donums)	Number of Plots
i)		
ii)		
iii)		
iv)		

Number of livestock? _____ Type? _____

21. If you grow something different on your land compared to the situation before land consolidation, what made you change to different crops?

22. What was your total income from farming last year? £CY _____

What was your total expenditure on farming last year?

£CY _____

What was your total income from farming the year before land consolidation? £CY _____

What was your total expenditure on farming the year before land consolidation? £CY _____

(If these income questions prove difficult go to the next question.
If not, go to question 24).

23. In general would you say that your net income from farming now is:

more ☐ less ☐ or the same as it was before land consolidation ☐
(tick the correct box).

24. If your income from farming has increased, to what extent do you feel that this had been due to land consolidation? (tick the correct box):
entirely ☐ partly ☐ not at all ☐

What other factors have increased or decreased your farm income?

25. How much did you earn from other (i.e. non-farm) work last year?

£CY _____

How much did you earn from other (i.e. non-farm) work the year before land consolidation? £CY _____

(If respondent cannot answer, was this the same ☐ more ☐ or less ☐ than last year? Tick the correct box).

26. Compared to the situation before consolidation, are your farming costs per donum now more ☐ less ☐ or the same ☐ (tick correct box).

What costs per donum have changed the most after land consolidation?

27. Do you own any land jointly? YES ☐ NO ☐

If YES, how much? _____ (donums)

How many plots? _____

Did you own land jointly before land consolidation? YES ☐ NO ☐

If YES, how much? _____ (donums)

How many plots? _____

28. Have you ever sold any of your land? YES ☐ NO ☐

If YES, when? _____ (year)

How much land? _____ (donums)

How many plots? _____

Where was the land situated? _____

29. Have you ever bought any land? YES ☐ NO ☐

If YES, when? _____ (year)

How much land? _____ (donums)

How many plots? _____

Where was the land situated? _____

30. What is the size of the land you own outside the land consolidation area, but inside the village area? _____ (donums)

How many plots? _____

Do you cultivate any of this land? YES ☐ NO ☐

If YES, how much? _____ (donums)

31. How much debt do you owe now? £CY _____

To whom is it owed? _____

Why did you borrow the money? _____

What was the amount of debt that you owed before land consolidation?

£CY _____

To whom was it owed? _____

Why did you borrow the money? _____

(If respondent cannot answer, was this the same ☐ more ☐ or less ☐ Tick the correct box).

If the amount of debt that you owe has increased, give the reason

why: _____

32. Before land consolidation was there enough water to irrigate: all ☐ some ☐ or none ☐ of your plots? (Tick the correct box).

Is there enough water now for irrigating: all ☐ some ☐ or none ☐ of your plots? (Tick the correct box).

33. Do you use: more ☐ less ☐ or the same ☐ amount of water as you did before land consolidation? (Tick the correct box)

Last year, how much did irrigation water cost you? £CY _____

34. Do you possess any of the following now?

	NOW		BEFORE LAND CONSOLIDATION
Radio	<input type="checkbox"/>		<input type="checkbox"/>
Television	<input type="checkbox"/>		<input type="checkbox"/>
Fridge	<input type="checkbox"/>		<input type="checkbox"/>
Washing Machine	<input type="checkbox"/>	Tick The	<input type="checkbox"/>
Tractor	<input type="checkbox"/>	Correct	<input type="checkbox"/>
Rotavator	<input type="checkbox"/>	Box	<input type="checkbox"/>
Spray	<input type="checkbox"/>		<input type="checkbox"/>

Did you possess any of the following before land consolidation?

(Use the boxes above)

35. Has an employee of the Land Consolidation Authority ever visited you at home? YES ☐ NO ☐

36. Did you vote for ☐ or against ☐ the land consolidation scheme in your village? (Tick the correct box).

37. How do you feel about land consolidation now? Do you strongly agree with it ☐ agree ☐ are uncertain ☐ disagree ☐ or strongly disagree ☐ ? (Tick the correct box).

38. Would you be willing to co-operate with other farmers in your village to pool the land and farm it together, sharing the costs and profits?

YES ☐ NO ☐ UNSURE ☐

Why do you feel this way? _____

Would you have been willing to do this before land consolidation?

YES ☐ NO ☐ UNSURE ☐

Why did you feel this way? _____

39. Have you ever purchased any farm machinery since land consolidation took place? YES ☐ NO ☐

If YES, what sort of machinery? _____

How much did it cost? £CY _____

40. Are you thinking of giving up farming? YES ☐ NO ☐

Did you think of giving up farming before land consolidation?

YES ☐ NO ☐

41. How many times have you used the agricultural extension services in the last year? _____

Why did you use the service? _____

Compared to the time before land consolidation, was this the:

same ☐ more ☐ or less ☐ Tick the correct box.

42. Do you want your children to stay in farming? YES ☐ NO ☐

Was this feeling the same before land consolidation? YES ☐ NO ☐

If NO, why do you feel differently now? _____

43. If you were a farmer before consolidation how important were the following factors in your farming operation before land consolidation?

43. (cont'd)

Factor	Essential	Very Important	Important	Not Really Important	Irrelevant
i) Enlarging your farm					
ii) Spending more time farming					
iii) Spending more money farming					
iv) Attending agricultural training courses					
v) Using more machinery					
vi) Using new crops					

Place a tick under the correct response.

If you are a farmer now, how important are these factors at the moment in your farming operations?

Factor	Essential	Very Important	Important	Not Really Important	Irrelevant
i) Enlarging your farm					
ii) Spending more time farming					
iii) Spending more money farming					
iv) Attending agricultural training courses					
v) Using more machinery					
vi) Using new crops					

Place a tick under the correct response.

44. As a landowner, how important are the following factors in your ownership of your land?

Factor	Essential	Very Important	Important	Not Really Important	Irrelevant
i) Making as much money as you can					

44. (cont'd)

Factor	Essential	Very Important	Important	Not Really Important	Irrelevant
ii) Making a <u>satisfactory</u> income					
iii) As an investment for the future					
iv) Enjoyment of farm work					
v) Chance to do work without supervision					
vi) Feelings of pride of ownership					
vii) Feelings of contentment					
viii) Following the family tradition					
ix) Recognition and prestige					
x) Dowry for children					

Place a tick under the correct response

45.

- (a) Where, or from whom, did you first hear about land consolidation generally? Was it from any of the following (tick the appropriate boxes).

a

	Question (a)	Question (b)	Question (c)
i) Television or radio	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ii) Newspapers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
iii) Pamphlets, magazines or books of the L.C.A.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
iv) Posters of the L.C.A.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
v) Slide-shows by the L.C.A.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
vi) Conversation in the coffee-shop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
vii) Conversation at home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

45. (cont'd)	Question (a)	Question (b)	Question (c)
viii) Father or other relative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ix) Local farmers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
x) Personal travel or visiting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
xi) Organised visits by the L.C.A.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
xii) School or college	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

(b) After you first hear about land consolidation generally, who or what helped you to make up your mind that you liked or disliked the idea?
(Use the list above again but tick the boxes under Question (b)).

(c) After you decided that you did like land consolidation, who or what helped you to decide that it would be a good thing for your own farm?
(use the list above again, but tick the boxes under Question (c)).

46. How strongly do you agree or disagree with the following statements about land consolidation and the possible effects that these have had on your farming operations?

Statement	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
i) The closeness of plots to each other means that I can spend more time working on each plot					
ii) The closeness of plots to each other has reduced production from my fields					
iii) The closeness of plots to each other has allowed me to concentrate on growing fewer crops					
iv) The closeness of plots to each other has reduced the costs of production per donum on my farm					

46. (cont'd)

Statement	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
v) The new farm road network has not been constructed well					
vi) The new road network has allowed me easier access to my plots					
vii) Even with the new roads there are still conflicts over access to my plots					
viii) Because of the new farm roads, I spend more time working in my plots					
ix) The new farm roads have not helped me in moving my products to the co-operative or to local markets					
x) The new plots have become more compact in shape					
xi) The new plot shape has allowed me to use all my land more effectively					
xii) It is still difficult to use machinery in the new shaped plots					
xiii) The new larger plots have allowed me to increase production per donum					
xiv) Because of the new larger plots my production costs per donum are lower					
xv) The enlargement of plots has allowed me to increase my cropped area					
xvi) All my crops can now be irrigated because of plot concentration					

46. (cont'd)

Statement	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
xvii) Irrigation is more difficult because of plot concentra- tion					
xviii) Increased irrigation has meant a change in the crops that I grow					

Place a tick under the correct response

APPENDIX CEXAMPLE OF KOLMOGOROV - SMIRNOV (K-S) TEST

Null Hypothesis (Ho): There is no difference between the two samples.

Alternative Hypothesis (Hi): Older holders will have lower scores on
instrumental land values.

Dependent Variable: instrumental land value (two groups, high and low
scores).

Independent Variable: age of holder (six groups with ranges of 0-40, 41-45,
46-50, 51-55, 56-60 and over 60 years).

Test: K-S, one-tailed.

Data:

Holders' Attitudes to Instrumental Land Values

	Age Groups						Total
	Below 40	41-45	46-50	51-55	56-60	Over 60	
High score	32	7	29	19	1	1	89
Low score	25	7	18	18	19	24	111
Cumulative Frequencies of Data Above							
High score (S_{89} (X))	0.36	0.44	0.76	0.97	0.98	1.00	
Low score (S_{111} (X))	0.22	0.28	0.44	0.60	0.77	1.00	
S_{89} (X) - S_{111} (X)	0.14	0.16	0.32	0.37	0.26	0.00	

Method:

The data above gives the age groups and instrumental attitudes to
land ownership. The χ^2 test cannot be applied to the figures without
cell aggregation because some cells have expected frequencies below 5.

Data were recast into two cumulative frequency distributions, with

the high score sample being $Sn_1(X)$ and the low score sample $Sn_2(X)$.

These figures were converted to decimals for ease of computation. By simple subtraction one can find the difference between the two sample distributions at the various intervals. The largest of these differences in predicted direction is 0.37: that is $D = \text{maximum } (Sn_1(X) - Sn_2(X))$.

Goodman and Kruskal (1954) have shown that;

$$X^2 = 4D^2 \left[(n_1 \cdot n_2) / (n_1 + n_2) \right]$$

This formula has a sampling distribution which is approximated by the X^2 distribution with df equal to two and it is usually used when n_1 and n_2 are large. (It can be used with small samples too, but in such case it leads to a conservative test (Siegel, 1966)). The significance of the observed value D is determined by solving the above formula for the values D (0.37) n_1 (89) and n_2 (111) and by referring to the x^2 distribution table. Substituting values in the formula one gets

$$X^2 = 4(0.37)^2 \cdot (89)(111) / (89 + 111) = 27.04$$

The probability associated with $X^2 = 27.04$ and $df = 2$ is less than 0.001. This is very significant, enabling one to reject the null hypothesis (H_0) in favour of H_1 .

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ABSTRACT

LAND FRAGMENTATION AND CONSOLIDATION: AN EVALUATIVE

STUDY ON CYPRUS

Stephen P. Burton

Land fragmentation is an important aspect of farm structure in many parts of the world. It generally results from population pressure and partible inheritance. Drawing from a wide range of countries the difficulties of operating a fragmented holding are investigated and the rationality of some fragmented farms noted. The process of land consolidation is examined, including a discussion of the empirical and theoretical results of consolidation programmes. 'Problem areas' of consolidation activities are then identified and this sets the scene for the presentation of a number of methodological approaches for the evaluation of land consolidation in Cyprus. Four different methods - cartographic, behavioural, economic and social - are outlined and a number of significant variables highlighted.

The study area of Cyprus is then introduced, with particular attention focused on fragmentation data drawn from the 1946 and 1977 Agricultural Censuses. The main attempt to deal with fragmentation in Cyprus was the Land Consolidation Law of 1969. The objectives of the law are set out and the procedures for carrying out consolidation described. Some of the immediate changes brought about by consolidation are presented, based on official documentation. A more detailed evaluative study of the impact of consolidation for the five villages involved in the first phase of the consolidation programme was carried out using a questionnaire survey of 200 holders. Land-use surveys were also made of the consolidated village areas. The results suggest that land consolidation has done much to change the economic and social life of the affected communities although there were evident differences in the relative level of changes both within and between the five project villages. Difficulties with the Cypriot consolidation process are also identified, especially the refragmentation of consolidated land which threatens the viability of the whole programme. Finally, it pointed out that the general success of consolidation activities in Cyprus may act as a 'model' for other developing countries in the Mediterranean attempting to improve and modernize their land-holding structures.