Urban and peri-urban land use

The city and its environs offer an excellent case-study of land-use issues and conflicts. Land-use patterns are usually more complex and dynamic than in the deeper countryside. Demands for the use of land as space and as ecosystem come into contact with each other, and the conflicting concepts of land as private property and as a common-property resource come into contact with each other as social (planning) controls are imposed on the extent to which economics are allowed to dominate land-use competition. Most of the classical models of land use have been derived in relation to the city and the rural area around it, and it is here that the degree of public control of land use is strongest, at least in the western world. Urban and peri-urban areas therefore can illustrate many of the basic principles of land use, and many of these principles can be more easily demonstrated here than anywhere else. In this chapter, three main themes will be considered in relation to the city and its surroundings: theories and patterns of land values and their significance for land use; dynamics of land use in the zone of contact between town and country; and public responses, expressed in the form of green belts and other measures, to the pressures underlying these dynamics.

LAND VALUES

As indicated in Chapter 1, land values vary both with fertility (and with other physical or environmental factors) and with location. Fertile tracts of land usually produce greater levels of output for given levels of input than infertile tracts, and are therefore more valuable and command higher prices. Land values will usually there-
fore vary with soil types and climatic conditions, especially when agriculture and forestry are the main land uses. But for some types of land use, location is far more important than physical land type. Some locations are highly prized because of their high degree of accessibility to large numbers of potential shoppers, or because of their convenience for travel to work, or for ready access to markets. Competition for the use of these locations is intense, and they command high prices. Prices, in turn, are an important factor in the use to which a piece of land is put. Very expensive land, for example, is more likely to be used for retailing than for ranching. Enormous differences in land values can exist over distances of a few kilometres or even a few hundred metres, especially within and around cities. As a result, land uses may be sorted or separated according to their ability to pay for land, although economics is, of course, not the only factor that determines the use to which land is put, and economic forces are usually circumscribed by a variety of social, legal and political factors. Nevertheless, these economic forces remain strong, and they cannot be ignored in any analysis of land use, especially around cities.

The ideas of Johann Heinrich von Thünen underlie and pervade theories of land values and land use. Von Thünen was the owner of an estate near the town of Rostock on the Baltic coast of what is now East Germany. In 1826, he published a work entitled Der Isolierte Staat in Beziehung auf Landwirtschaft (The Isolated State in relation to Agriculture), in which he tried to work out the most profitable pattern of land use on an area of uniform land surrounding a single market for land produce (see Hall 1966, for an English translation). The main variable factor in his analysis was transport costs, which were, of course, related to distance and the nature of the commodity (and especially its ratio of value to bulk). He made various assumptions which simplified his analysis: for example, he assumed that the cost of transport was proportional to distance and that costs of production, other than transport, were constant. For a given crop, net returns or economic rent (see Ch. 1) would decrease with increasing transport costs and hence with increasing distance from the city. However, the gradient of decreasing rent would vary from crop to crop. The produce of some crops would be more sensitive to transport costs than other crops. Bulky, low-value commodities would be more sensitive than higher value commodities such as wheat. If demand existed for several land products (within an 'isolated state', with no foreign imports), then the most profitable land use for a given location could be identified by constructing the graphs of economic rent of the various alternative land uses, as indicated in Fig. 5.1.

Fig. 5.1 Von Thünen analysis and pattern.
(a) Graph of profit per unit area for single land use
(b) Graph of profit per unit area for three land uses
(c) Resulting pattern of rural land use around one quadrant of city.

If land-use decisions were determined by economics alone, and if the assumptions on which the analysis was based were valid in reality, then the pattern of land uses around a city market would be in the shape of concentric zones or rings. In The Isolated State, horticulture and dairying dominated the innermost ring immediately around the city, followed successively by timber-growing, intensive arable farming, less intensive arable with long ley, three-field arable, and finally ranching. There is a clear gradation of intensity within the arable zones, it being sensible to use the innermost arable zone most intensively, and there is an ordering of the rings in accordance with the sensitivity of their products to transport costs. Perhaps the position of timber-growing in an inner ring seems surprising, but an early nineteenth-century city used large quantities of timber (a commodity bulky in relation to its value) for both fuel and construction.
The mode of analysis devised by von Thünen is far more important than the actual sequence of land-use rings prescribed in *The Isolated State*. The ordering of the rings obviously depends on levels of demand and on relative transport costs, both of which vary through time. Furthermore, the regularity and even the existence of concentric rings of land use will depend on the initial assumptions. Variations in land fertility are one potentially distorting factor. Another is that transport facilities tend to develop along specific lines, and that transport costs are not necessarily proportionate to distance. In addition, the real costs of transport have decreased since von Thünen’s time, resulting in a flattening of the gradients of the type illustrated in Fig. 5.1, and a decrease in the importance of transport costs relative to other production factors. Most cities in the western world are to-day supplied from areas extending far beyond their immediate hinterlands, and few exist in ‘isolated states’. For numerous reasons, therefore, few modern cities are surrounded by the concentric zones of land use that might be expected from the von Thünen model.

This does not, however, invalidate the form of analysis first attempted by von Thünen, nor does it mean that no traces of concentric zonation may be detected. Clear elements of zonation were apparent around nineteenth-century London, with dairying and market gardening in the innermost zones, cereal growing in the intermediate locations and the equivalent of ranching in the remoter parts of the country to the north and west (e.g. Chisholm 1962). Within this broad pattern focusing on the capital city, other local patterns were centred around provincial towns and cities. Aberdeen, for example, in the nineteenth century was partly surrounded by market gardens and nurseries (Fig. 5.6a, p. 142).

Much of the concentric pattern has now disappeared at both the national and local scales, but some traces remain, especially in the form of horticulture. Concentric patterns have been reported from around cities such as Montevideo (Griffin 1973) and Addis Ababa (Horvath 1969), where supplies of food and other land products still come largely from the local hinterland. At the broader scale, elements of concentric zonation reminiscent of von Thünen were detected by Jonasson (1925), who mapped the decreasing intensity of agriculture in Europe (as indicated by the levels of yield of eight crops) with increasing distance away from a core area encompassing Belgium, the Ruhr and part of lowland England, where the dense populations offered a market that could be likened to the central city of the isolated state. More recently, Belding (1981) has found a statistically significant relationship between net return per farm (corrected for size) and per unit area, on the one hand, and accessibility to aggregate demand, centred on Benelux and decreasing radially outwards, on the other.

Peet (1969, 1972) has extended the scale still further, seeing north-west Europe as the focal market of a global producing system made possible by the great reductions in real transport costs with the development of the railways and cheap ocean shipping during the nineteenth century. The average distance of transport of agricultural products increased markedly during the century, but the average distance of transport for each commodity remained in similar rank order. This suggested that at least some elements of zonation in land production remained, even if the zones were becoming wider and had been displaced outwards. As transport costs fell relative to other costs of production, the control exercised on land use by distance and location weakened, and the role of environment factors such as land quality became relatively stronger.

Traces of concentric zonation of rural land use are still visible around some cities even in the western world. Nurseries and market gardens constitute one element; dairy farming may constitute another, but even if all these traces had disappeared, the significance of von Thünen and his mode of analysis would survive. In recent decades, his work has been the foundation on which others have built, and indeed have extended his analysis from the country into the heart of the town. One of the names most closely associated with this extension is Alonso (1960, 1964), although Alonso himself built on the work of other American land economists of earlier decades. Notable among these were Hurd (1903), Haig (1926) and Ratcliff (1949).

The premise underlying the work of Alonso and his predecessors is that central, and therefore accessible, sites are attractive to most if not all land users. Accessibility is obviously a prerequisite for retailing if the potential shopping market is to be tapped effectively. Other commercial land users may seek central sites for the same reason, and accessible sites may also be sought by manufacturers so that they can assemble their raw materials and distribute their products easily and cheaply. House purchasers may seek central sites so that travelling costs to work, shopping and entertainment are minimised. Farmers will want a location near to the city if their produce is directed at the city market. A wide range of land users may therefore value accessible sites near the town centre, which historically has been the focal point of the local road and rail network, and which therefore has been the point of maximum accessibility.

Some land users, however, may value centrality more than others. For example, the importance of a central site is much greater to a shopkeeper than to a farmer. Each type of land user will therefore place different evaluations on centrality and on how important it is to his enterprise. Each user may be prepared to pay more for a central, accessible piece of land than for a remote, peripheral one,
but the price differential and hence the price gradient away from the most accessible site will depend on the type of land use and on the extent to which it depends on easy accessibility. Alonso summed up these ideas by saying that each type of land user can be assumed to have a characteristic bid-rent curve. These curves will reflect the prices that the user is prepared to pay for sites at various distances from the centre: some types of land user may place a higher premium on centrality and accessibility than others.

Fig. 5.2 Bid-rent curves: ability to pay rent against distance for three urban land uses. By superimposing the curves, the comparative advantage of each use in each location can be established (as in Fig. 5.1) and a theoretical pattern of urban land use determined.

If these bid-rent curves (Fig. 5.2) are superimposed, it can be seen that the types of land use with the steeper curves will outbid those with flatter curves in the central zone, and that the reverse will be the case in the periphery. In other words, a pattern of concentric zonation of land use, akin to the von Thünen model of agricultural patterns, will be found within the city. This pattern will only exist, of course, if economics is the primary factor in decision-making, and if assumptions about the uniformity of land and the proportionality of transport costs to distance are valid.

Inherent in this model is the idea that land becomes cheaper with increasing distance from the centre; and so within the residential belt, for example, it becomes possible for a potential residential land user to buy (or rent) a smaller site in the inner part of the ring, or a larger more spacious one for the same price further out towards the periphery. If he chooses the more spacious option, he must ‘trade off’ the benefits of the larger site against the higher costs of travelling to the city centre. The same principle can be applied to other zones such as retailing. All types of shop may seek sites of maximum accessibility, but furniture stores, for example, may need larger sites for storage than, say, shoe shops, and may therefore be forced to ‘trade off’ the benefits of a site of maximum accessibility against the disadvantages of very high land prices.

A further implication of the model is that bid-rent gradients are proportional to transport costs. If these costs fall over time, as they have done during the present century, then the influence of location and accessibility on land values and land use will decrease.

MODELS OF URBAN LAND USE

In theory, a direct relationship should exist between land value and location, between land use and land value, and hence between land use and location. To what extent does this relationship exist in reality, and to what extent do cities and their environs conform to the patterns of concentric zonation that might be expected from analyses such as those of von Thünen and Alonso?

In 1925, long before Alonso’s work was published, Burgess suggested a concentric zonation model of urban structure (Fig. 5.3a).

THREE GENERALISATIONS OF THE INTERNAL STRUCTURE OF CITIES

DISTRICT:

1. Central business district
2. Wholesale light manufacturing
3. Low-class residential
4. Medium-class residential
5. High-class residential
6. Heavy manufacturing
7. Outlying business district
8. Residential suburb
9. Industrial suburb
10. Commuters’ zone

Fig. 5.3 Models of urban land use.

This model, or simplified, idealised representation of reality, was based on Chicago, and was intended to describe the structures of contemporary, rapidly growing industrial cities in North America. Burgess did not claim that the model was relevant in other settings,
but it has sometimes been assumed subsequently that he intended that the model be more widely applicable. The model has attracted enormous attention because of its apparent elegance and simplicity, and it is thoroughly reviewed and criticised in all standard texts on urban geography.

Some themes of criticism have been widely rehearsed. One is that gradual belts of transition are more common than sharply defined zonal boundaries. Related to this criticism is the view that land uses are heterogeneous rather than homogeneous, and that single-use zones cannot validly be identified or defined. In other words, many critics have taken the view that the model is an over-simplified version of reality. The basic lack of conformity between the Burgess model and actual patterns is its most obvious weakness, and this lack of conformity has led to alternative models of urban structure being suggested.

In 1939, Hoyt put forward his sectoral model of urban structure, based on an analysis of the patterns of rent in residential areas in 25 American cities (Fig. 5.3b). This analysis revealed that the pattern of rent (or land value) was neither random nor annular, but rather was dominated by sectors or wedges radiating outwards from the urban centre. The main feature of this model was that a strong directional element was introduced, with wedges of distinctive land uses developing along the spines formed by major radial lines of communications. Distance from the town centre was not discounted entirely as a control on land use, but implicit in the model was the idea that direction as well as distance of travel had a profound significance. High-quality residential areas, for example, do not encircle the city, as in the Burgess model, but rather form a wedge along an axis of communications. As the city grows, new high-quality housing, for example, will be built at the outer edge of this wedge, rather than in a narrow ring around the city. Industrial land use may also extend radially outwards along a river, canal or railway to form another wedge, separated as far as possible from the high-quality residential zone.

Hoyt's model was based on the more objective analysis of real residential rent patterns. It is perhaps not surprising, therefore, that the Hoyt model is usually regarded as a more accurate and faithful representation of the land-use structure of western cities than the Burgess model.

A third model has been suggested by Harris and Ullman (1945), which was less simple and elegant than those of Burgess and Hoyt, but perhaps closer to reality. The multiple nuclei model (Fig. 5.3c) recognises that many cities do not grow outwards only from a single centre, but rather absorb other, previously separate nuclei in the course of their growth. As the city grows, specialised land use de-

velops on separate tracts of land, which are square, rectangular or irregular in shape, and not in the rings and wedges of Burgess and Hoyt. This model is purely descriptive, and has no deductive basis. Its structure, however, perhaps reflects the reality of rectilinear land units typical of much of the United States better than the models of Burgess or Hoyt. It is much less specific than the other models, and perhaps implicit in it is the view that a simple generalisation of urban land-use patterns is not possible. However, if definite and regular patterns of land use can be expected from land economics, as discussed in the previous section, why are more distinct patterns of land use not apparent in the real world?

Land economics and models of land use

Part truth or whole truth?

A variety of answers can be suggested in response to the question of why more distinct patterns of land use are not apparent. At one level, each model may be valid as a partial but incomplete representation of reality. Vance (1971), for example, observes that the 'natural' physical tendency for accretion to occur in rings makes the concentric-zone theory logical and the corresponding model accurate in part. The notion of 'filtering down' of housing from the richer to the poorer, allied to the association of social status and location of residence, lends credibility to patterns of the Hoyt type, and the growth of cities to engulf previously separate towns and villages is a historical fact that accords with the multiple-nuclei model. Vance concludes that the existence of this set of theories of partial truth indicates that urban patterns can be understood only in terms of a series of explanations, which in combination approach completeness, and not in terms of a single-factor explanation. He proceeds to relate different elements in the urban structure to what he calls different land-assignment systems, distinguishing the medieval, capitalist and post-capitalist views of land. During the capitalist period, for example, when the American urban models were being propounded, land was viewed as property valued primarily for its economic return. Vance contrasted this view of land with both the medieval notion of land as a site for urban activity rather than as property, and with the post-capitalist view of land in which there is social as well as economic value.

Land values: theory and reality

A second level of answer to the question may be sought within the realm of ideas about patterns of land values within the setting of
Land use

twenty-first century American cities, which have been the seed-bed both of urban models and of theories of land economics. To what extent do the theoretical patterns of land values expected from bid-rent theory exist in reality? Relatively few comprehensive studies of patterns of land values have been carried out, perhaps because of data problems and the paucity of reliable and comprehensive sources, but one major study by Yeates (1965) in Chicago is instructive. Yeates attempted to reconstruct the pattern of land values decennially between 1910 and 1960. He found that land values decreased with distance from the city centre for each time period. Interestingly, however, he found that there was a steady decline in the strength of the association: a clearer gradient of land value was evident in 1910 than in 1960. Indeed by 1960 he found that in some sectors, land values actually increased towards the periphery, leaving a trough of lower values in the intermediate zone. He concluded that the rise of subsidiary business centres had weakened the influence of the main centre as the primary focus of high land values. Furthermore, the influence of recreational and physical amenities on land values appeared to have increased over the decades. A zone of high-value land extended along the shore of Lake Michigan, probably as a result of a combination of amenity reasons and proximity to the communications axis of Lake Shore Drive. In short, elements of a radially decreasing pattern of land values could be discerned, but the pattern had become more complex down through the twentieth century, and it was clear that it was influenced by other factors as well as by distance from the centre. More recently, Chicione (1981) has concluded that proximity to the urban core in the Chicago area is still reflected in farmland prices in the rural fringe, despite the extensive suburbanisation and decentralisation that have occurred in recent decades. Within the fringe, the influence of soil productivity on farmland values is overshadowed by locational factors. These, however, are not the only influence on land values, and in particular, the uses of neighbouring areas of land may also be a significant factor.

Broadly similar conclusions emerge from studies of other American cities. Brigham (1965) found that the pattern of variation in residential land values in Los Angeles revealed a positive correlation with accessibility to employment opportunities in the central business district, but that this relationship was sometimes overshadowed by low amenity levels near the main concentrations of employment, and by the effect of secondary employment centres. In a study of Milwaukee, Downing (1973) found a significant correlation of land value with distance from the commercial centre, but a large proportion of the variation in land values remained unexplained by this variable alone. He concluded that other factors such as air quality and proximity to competing or complementary land uses may be important.

Outside North America, further support for the idea of decreasing land values with increasing distance is not lacking. Distance was found to be a significant variable in relation to the unit price of land purchased for municipal housing around Edinburgh (Richardson 1974): an average gradient of £1,089 ha/km was found, for the period between 1952 and 1967. Again, variables other than distance were found to be significant in relation to variations in land values. For example, price gradients were steeper in some directions than in others, and the type of seller (e.g. whether a farmer or institutional owner) was a complicating factor.

The influence of distance from the Central Business District (CBD) on the value of land in the periphery of Auckland has been analysed for a number of years between 1955 and 1970 by Moran (1978), who found not only a significant relationship but also one which strengthened over this period, in contrast with the conclusion of Yeates in Chicago.

In short, there is clear evidence that distance from the city centre is a significant factor in determining land values, and hence in influencing land use, but it is by no means the only influence. Perhaps on a homogeneous, isotropic plain without the complication of river, lake, hill or valley, and in an isolated city, the spatial pattern of land values might conform more closely to one of concentric zonation. In the real world, such plains and such cities are rare.

Land units and land ownership

Another reason for real patterns of land use to deviate from theoretical patterns of concentric zones is the effect of the pattern of units of land ownership and the behaviour of land owners. If land units were small, regular in size and shape, and in the hands of owners or controllers who behaved consistently and identically, then the influence of the pattern of land holding might be minimal. In the real world, of course, these conditions rarely occur. For reasons of land history, perhaps they might be approached more closely in some parts of the Mid-West of the United States than in most other areas. In the case of Chicago, Fellman (1957) has shown that the initial sub-division of land units prior to building contains elements of each of the three main urban models: on secondary or re-subdivision, concentric zones and sectors are clearer than multiple nuclei, but at the level of individual lot sales, nuclei are a clearer pattern element than circles or sectors. In other words, different (partial) patterns are discernible at different stages in the physical process of urban development.
In the Old World, the impress of the pre-existing pattern of land holdings may be stronger than in cases such as Chicago. Numerous examples have been reported on how the morphology of cities in England has been affected by patterns of land ownership. In the case of Birmingham, for example, rapid growth on the north side during the eighteenth and nineteenth centuries contrasted with much slower growth on the south and east. This uneven pattern has been attributed to the pattern of land holdings, since the owners of four landed estates on the south were unwilling to release land for building (Wise 1948). In the case of Sheffield, the influence of the Fitzwilliam estate on the pattern of growth in the 1920s and 1930s has been reported by Rowley (1975), who concluded that social and political factors were more important than the motive of maximum profit in the Fitzwilliam thinking. Indeed, Rowley rejects urban theories based on concepts of rent maximisation and the market mechanism as being incomplete and incorrect before the late nineteenth century, when an effective land market developed. If economic motives are not present, or if they are over-shadowed by other factors, then bid-rent theories cannot explain urban land-use patterns.

At the more detailed level, the layout of streets and buildings in the urban plans of cities such as Leeds and Bradford have been shown to be related to the framework of land ownership at the time of development (Ward 1962; Mortimore 1969). Street layouts and building patterns are typically discontinuous and fragmented, because development proceeded in a piecemeal and uncoordinated fashion on small land holdings as they became available during the nineteenth century. The larger land holdings and estates remained in the hands of their traditional owners, who resisted urbanising pressures more strongly than their smaller brethren who were more strongly motivated by economic considerations. At first, these larger estates formed gaps in the urban fabric. Some eventually became urban parks, and when others eventually succumbed to building pressures, their scale offered possibilities of more regular and compact layouts than had been possible when development had to operate within the framework of small land units. Some of the larger estate owners imposed restrictive stipulations or covenants on releasing land for urban development, constraining the type or form of development in a way that cannot be explained solely in terms of land economics.

The type of decision taken by the estate owner and the influence on urban morphology could vary through time. For example, in the 1840s the Ramsden Estate strictly controlled the form of building in the growing town of Huddersfield, but by the latter part of the century it was unable to attract builders on its terms and so the degree of influence and control lessened (Springett 1982). The role of the pattern of land holdings continued down into more recent times with the development of the large peripheral municipal housing areas which are characteristic of most British towns and cities. In the case of Bradford, for example, large estates were sought for this purpose in preference to smaller units, because of the convenience they offered at the various stages of negotiations leading to acquisition, planning and construction. Indeed, Mortimore (1969) felt able to conclude that in the growth of Bradford during its formative period from 1850 to 1950, “the existing property units became an invisible skeleton for the growing body of the town.”

If the detailed pattern of the city is at least partly a reflection of the pattern of land ownership at the time of its growth, the urban land-use pattern is the product of numerous separate decisions on land use and land development. This obvious point has often been overlooked in work on urban structure. Bourne (1976) has made a notable attempt to relate the broad evolution of urban structure and the behaviour of developers, but such efforts to bring together the broad pattern and the individual decision have been few in number. Bourne also points out that different types of developer are responsible for different types of development: private developers for suburbs; public authorities and planners for roads and utilities; and corporations for industrial facilities. The implication is that with different types of developers and land owners, different goals and different decision behaviour are to be expected.

The pattern of land use in cities is usually more complex than simple models would suggest, and some parts of many cities consist of mixtures of land uses rather than single land-use types. Broad zones of transition may exist, rather than sharp zonal boundaries. One possible reason may lie in the basic concept of bid-rent relationships, which might at first sight be expected to give rise to clear and simple concentric land-use zones. Whitehand (1972), however, points out that bid-rent relationships are not constant. House-building, in particular, is characterised by booms and slumps. During booms, housing may have a steeper bid-rent gradient than institutional uses such as schools or hospitals or parks, which may then become established in locations beyond the housing zone. During housing slumps, however, the housing gradient may be flatter, and institutional land use may then compete more successfully for land which in boom times would have been in the housing zone. In other words, the relative locations of housing and institutional uses may alternate, and Whitehand suggests that parts of the fringe zones of cities such as Glasgow may reflect these alternations and cyclical patterns of development.

One area of the city which displays particular complexity is the
transition zone around the city centre. This is a more or less continuous belt separating the retail-orientated heart of a city from the surrounding area given over mainly to non-commercial land uses. Within this zone, different processes may be active in different sectors. In one, commercial uses may be expanding, as offices take over previously residential properties. In another, commercial uses may be contracting, as the core of the CBD shifts slightly (see, for example, Griffin and Preston 1966) or even contracts. Historically, the city centre has always been the focus of retail activity because of its easy accessibility, but in recent times it has become less accessible. Whereas it was the focal point of tramway and rail services, it may be relatively inaccessible for a car-using population. Some retail enterprises may thus seek locations on the urban periphery, where easy accessibility by road may be combined with large car parks laid out on relatively cheap land. Manufacturing industry may be attracted to peripheral locations that offer easy accessibility from motorways, in contrast to the now congested inner cities. Changing transport modes may therefore give rise to different interpretations of accessibility, and ultimately to changing bid-rent gradients.

Finally, yet another reason for the lack of conformity between real cities and models of urban structure is suggested by the growth of municipal housing areas. Although economic factors may play some part in the selection of such areas, the process is not determined solely by market forces. Public intervention, expressing social goals and values, constrains the free play of market forces, as indeed does (at least in theory) the whole structure of the town and country planning system in Britain. In the terms of Vance (1971), the mode of land assignment is now post-capitalist, and is based not solely on economic but also on social values.

Although the major urban models conform only partly with the land-use patterns of modern western cities, this does not mean that they are of no value or interest. The concentric zone model, for example, is useful in illustrating the pattern that would result if land-use decisions were determined by economics, and if rents were simply a function of distance. Deviations from the model indicate the extent to which other factors play parts in land-use decisions. The same conclusion can be reached for the peri-urban zone around the city as for the city itself.

PERI-URBAN LAND USE

If the assumptions employed in von Thünién analysis are correct, the city should be surrounded by concentric zones of different types of agriculture and woodland, arranged according to their products and their characteristics in relation to transport. In practice, few cities in the west are surrounded by well-developed rings of agriculture, although traces of such a zonation may be the surviving remnants of formerly better developed zones. The evident complexity of much rural land use around the modern city reflects the facts that the assumptions of von Thünién analysis are simplifications, and that factors other than distance and transport costs play important roles in land-use decisions.

One of the main characteristics of cities in the western world during the last century and a half is rapid growth. Any assumption that the city is a static entity is a gross oversimplification. Also, as cities expand, they not only displace agricultural land at the urban edge, but also cast a shadow ahead of them. Urban influences, in one form or another, are felt on rural land use long before bricks and mortar displace corn and grass. The strength of these influences will vary with rates and pressures of urbanisation, and with the ways in which they are constrained by planning systems or other public controls on land use. They may give rise to consistent features of land use, whose extent and degree of development vary according to the strength of the influences.

Urban and rural land values

Land used for residential development or other urban purposes is much more valuable than land used for agriculture, by a factor of 10 or more. For example, Schmid (1968) quotes examples from a wide range of American cities and states: the prices paid to farmers for land for urban or other non-farm purposes ranged from about four to over 100 times those paid for farm purposes. At around the same time, agricultural land values in the vicinity of Copenhagen ranged from 1.0 to 2.5 DKr/m², as compared with 13.0 to 33.0 DKr/m² for land for development (Darin-Drabkın 1977). With such differentials, urban uses will almost invariably displace agriculture (unless other controls are imposed). Furthermore, land where urbanisation is expected to occur is more valuable than land where agriculture is expected to continue. The mere anticipation of urban development on an area of land increases its value. If this expectation is strong and confident, urban developers or speculators may purchase the land from the farmer, and be content to leave the land unused until it is developed, reaping capital appreciation rather than steady income. If the expectation is rather more vague, the land may not change hands, but the farmer may be reluctant to invest capital and effort in maintaining levels of fertility, drainage, fences or other capital equipment, and in particular he may be reluctant to invest in land uses such as orchards which require a number of years to mature and