CHAPTER 3

FUNCTIONAL CHARACTERISTICS AND DELINEATION OF URBAN FRINGES

A. MEANING AND CHARACTERISTICS OF URBAN-RURAL FRINGES

The shift from 20th to the 21st century has given concerns to urban geographers for the processes like urban dissolution, functional destabilization, urban gentrification, urban blight, regionalization, and beside others, globalization. The development of urban fringe areas hitherto has largely been described as a suburbanization process which is closely related to the general stage of urban advancement. Fringe areas are directly profited from the urban growth surpluses of the core-city. Urban development with the new millennium is characterized by fading structural boundaries and the outward shift of urban population i.e. in the hinterland of cities, such areas are also the preferred habitats of rural migrants, and incorporate a growing area of rural landscapes. Population growth and distribution as well as building activities are becoming increasingly dispersed. The out-migration of inhabitants from urban core areas is accompanied by the suburbanization of employment. The development of the productive sector shifts towards the urban-rural fringe which, in meantime, becomes a destination of tertiary uses mainly for the communication, entertainment or business administration sectors. The expansion of activities also gave rise to an increased out-migration, especially customer-oriented services to fringe areas.

a) Concept of Urban Fringe

Smith's discussion (1937) of the "urban fringe" around Louisiana marks the first use of this term to signify "the built-up area just outside the corporate limits of the city." As a landscape phenomenon, the fringe area varies from city to city, and
from one time to another. Around several cities in the Netherlands a fringe is barely recognizable; Paris is somewhat similar to the United States in the inter-mingling and scatter of land use, but there is a close dependence on public transport; London is different because of its Green Belt, although there is some scattering of land use, and some villages are located within this belt. In general, Dickinson (1967) concludes that, the modern European city "exhibits the same tendency to extend and explode" as the North American metropolis, "but not nearly to the same degree". Conversely, some American writers now question whether the urban fringe problem is disappearing, because "laws permit more cities to supervise zoning within a certain distance of their borders” (Murphy, 1966).

Outside North America, many studies conducted, for example, in Sydney (Wills, 1945), Adelaide (Smith, 1966), Melbourne (Johnston, 1966), and in London (Pahl, 1965) and Johannesburg (Hart and Partridge, 1966). The literature on urban fringe before 1970 makes a confusion of terminology and lack of clear delineation in case studies. The problem of evaluating and comparing cases has been increased by the following aspects:

i. their range in time, as prevailing economic conditions influences the rate of growth and internal characteristics of the fringe;

ii. the range in size of the urban center, from a small village to a metropolis or standard metropolitan statistical area, each with inherent differences in its fringe, according to the rate of growth, functions, and hierarchical relationship of the central place;

iii. the variation in type and degree of zoning control of urban invasion beyond a city's corporate limits, so that London's modified Green Belt results in a very different form of guided "over- spill" to Eugene-Springfield's "uncontrolled population expansion" (Martin, 1953 and 1957);
iv. differing social, economic and political contexts of the studies from different countries; and
v. differing aims and interests of various research workers.

b) Definition and Delineation of an Urban Fringe

What and where the urban fringe is. A precise definition and to obtain a map is not possible, but generally the urban fringe means those areas just beyond the built-up part of a city subjected to intense development pressures (for a thorough discussion of definitions, see Bourne and Simmons (1978), Systems of Cities. Oxford, Oxford University Press). The Fringe is not a line on map; it is a zone of radially diminishing urban-style activities. It is the existence of a fringe that prevents one being able to distinguish the urban from the rural, since the fringe has features of both.

The urban-rural fringe (URF) is the zone of transition in land use, social and demographic characteristics, lying between (a) the continuously built-up urban and suburban areas of the central city, and (b) the rural hinterland, characterized by the almost complete absence of non-farm dwellings, occupations and land use, and of urban and rural social orientation; an incomplete range and penetration of urban utility services; uncoordinated zoning or planning regulations; a-real extension beyond although contiguous with the political boundary of the central city; and an actual and potential increase in population density, with the current density above that of surrounding rural districts but lower than the central city. These characteristics may differ both in zonal and sectoral way, and can be modified through time (Pryor, 1968).

Its definition shifts depending on the global location, but typically in Europe where urban areas are intensively managed to prevent urban sprawl and protect agricultural land the urban fringe will be characterized by certain land uses which
have either purposely moved away from the urban area, or require much larger tracts of land.

The conceptual definition of urban rural fringe was propounded by R.J. Pryor in 1968. It is a zone of transition between the continuously built-up and suburban areas of the central city and rural hinterland. The Urban-Rural Fringe Area has also been defined as “the area of transition between well recognized urban land use and the area devoted to agriculture”. Therefore, urban-rural fringe is a continuous area that starts beyond the urban limits of cities.

A more comprehensive definition of rural-urban fringe given by Herington (1984), describes the distinctive characteristics that it is an area which is partly assimilated in the growing urban complex, which is still partly rural and where many of the residents live in the countryside, but are not socially and economically forming part of it.

Blizzard and Anderson (1952) have defined URF as the area of “mixed urban and rural land use between the points where full city services cease to be available, and the where agricultural land use predominate”.

In Asian countries, especially in China, rural urban fringe is defined as the surface located outside the urban outskirts/ the limit of the built-up surface to the region with rural features. It has been preferred to give the term ‘fringe’ instead of periurban because it is considered that the force of the town alters the features of the fringe and not vice versa through the penetration of the village features into the town or the fringe perimeter (Xu Feng, 2004).

In Indian scenario, “the Urban-Rural Fringe (URF) is an area of mixed urban and rural population and land use, which begins at the point where agricultural land use appear near the city and extend to the point where villages have distinct urban
land uses or where some persons, at least from village community commute to city daily for work or other purposes” (Husain, 2007). The URF area is neither truly urban nor truly rural. It has certain characteristic land use for example, garden centers, fruit, vegetable and floriculture fields, dairy works, poultry, farm houses, agro-based industries, boarding schools, colleges, new residential colonies etc. There is constant change in the land use. Land shifts from primary (agriculture) to secondary and tertiary economic activities. Therefore, these areas provide good opportunities of employment for both rural and urban population (Asif, 2010).

Metropolitan fringe areas have traditionally been seen as:

i. featuring a diversity of land uses that vary in relation with their urban and rural linkages;

ii. “transitional” in nature suggesting from one side “a patterned sequence of uses that become progressively more agrarian in orientation as one recedes from the urban centre”;

iii. inversely, “agricultural land uses, employment and rural linkages are seen as giving way to urban-oriented activities as distance to the city centre diminishes”; and

iv. populated mainly by poor residents recently arrived from rural areas, being engaged in multiple income-generating activities, mostly informal (Browder et al., 1995).

Urban Fringes acquire following heterogeneous patterns of growth, such as:

i. Metropolitan growth engulfing existing farmlands and villages.

ii. Rural migrants creating a “transitional social space” or “temporary holding location” in a rural- to-urban migration process.
iii. Suburbanization processes where urban dwellers move to the fringe searching for advantages in land rent, or to capitalize opportunities for land acquisition, speculation and informal enterprise (Browder et al., 1995).

The urban-rural fringe is also known as the outskirts or the urban hinterland, and can be described as the "landscape interface between town and country", or also as the transition zone where urban and rural uses mix and often clash (Garreau, 1991). Alternatively, it can be viewed as a landscape type in its own right, one forged from an interaction of urban and rural land uses.

c) A Review of Related Terms Attributed to Urban Fringe

Because of the diversity in understanding the concept and meaning of urban fringe and related terms, a number of attempts have been made to clarify concepts, and to differentiate between commonly used terms. After reviewing some ten definitions, Kurtz and Eicher (1958) differentiate between "fringe" and "suburb"; Wissink (1962) defines 'fringe," "suburbs," "pseudo-suburbs," "satellites" and "pseudo-satellites"; Schnore (1957) distinguishes between "satellites" and "suburbs"; and a number of writers have described different types of suburbs, some of which may be synonymous with the "fringe".

Martin (1957) has discussed satellite settlements with urban character. Areal differentiations have also been made, qualitatively, within the fringe: the "urban fringe" and the "rural-urban fringe" (Andrews, 1942); the "limited fringe" and the "extended fringe" (McKain and Burnight, 1953); the "suburban fringe zone" and the "outlying adjacent zone" (Reinemenn, 1960); and inner and outer fringe areas (Wissink, 1962). American Census categories permit the differentiation of urban fringe, rural non-farm (RNF), and rural farm (RF) within the Chicago fringe (Duncan and Reiss, 1956), and "true fringe," "partial fringe," and "adjacent rural townships" outside incorporated Detroit (Myers and Beegle, 1947); the area between the
Melbourne Metropolitan Area and Melbourne Statistical Division boundaries in 1966 Census of the Commonwealth of Australia provides a comparable census zone. The interest of human ecologists in the fringe has added the undefined terms "rururban fringe" and "rururbanization" to the literature; and "slurb," the "slopped-over suburb," is also another more deviant terminology (Parsons, 1967).

The period which extended from 1940’s onward by the end of 1970 has marked a period in which enormous work carried the aspects of urban fringe areas. After a gap of quarter century, this aspect again gained focus on research, as the world’s population increased at a faster rate since 1990’s. More and more people settled in urban areas to live. Rapid urbanization and industrialization resulted the formation of ‘Development Zones’ and ‘Real Estate’ hotspots, slattern a great amount of land brought in use and capital invested, which results in the serious social and ecological problems. In the coming decades, the world’s rapid urbanization will be one of the greatest challenges to ensuring human welfare and a viable global environment. According to current estimates, cities occupy 4 per cent of the world’s terrestrial surface which dwell by almost half of the global population, consume close to three-quarters of the world’s natural resources, and generate three-quarters of its pollution and wastes. Moreover, the United Nations estimates that virtually all net global population and economic growth over the next 30 years will occur in world cities, leading to a doubling of current populations.

The multidisciplinary scope of the subject invokes the interest from geographers and ecologists, to urban planners and civil engineers, to sociologists, to administrators and policy makers, students and finally the common man. Now the urban fringe related problems are not relates much concern in the developed countries but, they are getting the concerns especially in developing world, where urban population is increasing with a rapid pace.
In recent studies the term urban fringe again has deviated in time, place and
the urge of the research. City region, umland (Chang, 1961), hinterland, boomburbs
(United States Census, 2000) urban field, city periphery, peri-urban area, edge city
(Garreau, 1991), growth areas (Best and Coppock, 1962), exurbs (Spectorsky, 1955),
suburbs, penurbia (Gard, 2006), rural-urban interface, Prime Farmland Area
(USDA, 1997) etc., started be used by the researchers and different agencies.
Zeilhofer and Topanotti (2008) in their study of central Brazil, have used urban fringe
as ‘informal settlements’ as it is neither included purely in urban nor in rural category.
Some have termed as ‘rural-urban fringe’ but, on evolutionary basis it should be taken
as ‘urban-rural fringe’ as recently used by Anbumozhi (2007), in his work on Eco-
industrial Clusters in Urban-Rural Fringe Areas in Japan. The researcher too has
widely used this form (urban-rural fringe).

In recent American studies the authors have seen urban fringe areas as the
commuter towns, dormitory towns, college towns, resort towns, mill towns, project
towns and many more. Despite the lessons from the American experience, in some
developing countries such as China and India and the United Arab Emirates, the ‘edge
city’ is quickly emerging as an important new development formed as automobile
ownership skyrockets and marginal land which is bulldozed for development. The
outskirts of Bangalore in India, for example, are increasingly replete with mid-rise
mirrored-glass office towers set amid lush gardens and sprawling parking lots where
many foreign companies and corporate have set up head offices, retail centres, shops
etc. Dubai and Abudhabi offers other examples of such marvelous development.

d) Functional Characteristics of Urban-Rural Fringe Area

An urban-rural fringe can be described as the hinterland between town and
country or alternatively as the transition zone where urban and rural uses mix and
often clash. An urban fringe is characterized by certain land uses which have either
purposely moved away from the urban area, or require much larger tracts of land
Despite these urban uses the fringe remains largely open with the majority of the land is in agriculture, woodland or other rural use. However the quality of the countryside around urban areas tends to be low with severance between areas of open land and badly maintained woodlands and hedgerows.

The urban-rural fringe is the boundary zone outside the urban area proper where rural and urban land uses intermix. It is an area of transition from agricultural and other rural land uses to urban use. Located well within the urban sphere of influence the fringe is characterized by a wide variety of land use including dormitory settlements housing middle-income commuters who work in the main urban area. Over time the characteristics of the fringe change from largely rural to largely urban. Suburbanization takes place at the urban boundary of urban-rural fringe (Anbumozhi, 2007).

Problems stem from the competing land uses within this zone and the constant pressure for new development, even in areas that have green belt status (London) or other forms of protection. The issues of land use and prospective change are significant and are increasing in number.

Fig. 3.1 Transitional Zones of Urban-Rural Fringe and City Hinterland
An urban-rural fringe is an area characterized by a mixture of urban and rural features. As a result of the influence of the expanding city, the rural character of the fringe is gradually or sometimes very abruptly replaced by a more urban profile in terms of land use, employment and income, and culture. With this process of rural-urban transformation, pressure on land rises because of migration from the core city and rural areas and natural population growth. The pressure on land is further aggravated through the use of land for urban purposes, such as construction of building, urban residences and garbage disposal. Increasing pressure on land in the fringe villages not only changes the land-use character, but also causes degradation of natural resources in the rural areas. Living conditions of the rural communities are affected due to unstructured land-use planning, lack of adequate civil services and inability of the administrative system to handle institutional and factual problems of the changing urban-rural fringe areas (Anbumozhi, 2007).

The urban-rural fringe areas play a key role in providing the essential commodities needed in urban areas while acting as a playground for the rural economy. In almost all developing countries, rural areas are the centers of agricultural production, while the urban areas are the major consumers of it. The conversion of the agricultural produce into edible and or marketable products takes place often in urban-rural fringe which has an equal access to the raw materials and the markets which mainly lie in urban areas. In this process of adding value to the raw agricultural produce, the fringe areas suffer considerably with the environmental damages in the form waste disposal and resource constraints (Anbumozhi, 2007). The Fig.3.1 shows a typical example of activities generally seen in an urban-rural fringe area.
B. RURAL-URBAN CONTINUUM: MODELS AND PERCEPTION OF PLACES

a) Rural-Urban Transition

The Dictionary of Human Geography explains ‘rural-urban fringe’ as “rururban”, and defines the term ‘as the area located between the town and the rural zone, without delimiting it accurately in space, where the urban functions intermingle with the rural ones.’ It further defines the rural-urban fringe, specifying its limits and position within the framework of territorial systems only at a descriptive level, as a transition zone between the two extremes (Avram, 2009). The Oxford Dictionary of Geography explain the term as being the transition zone between urban and rural, but also between urban and suburban, the defining element is being the land use (sport grounds, airports, malls, parks etc.), which gives an urban character to the rural area. The inner and outer limits of this area are mostly determined through a method elaborated by Weiguo and Tian (2002). They proposed an analysis of the satellite images for delimiting different types of land use achieving the distinction among urban, rural, and transition zone at the pixel levels. The calculus gives the threshold among the three zones, the preponderant percentage emphasizing the limit through a t-test of differentiation of the rural-urban continuum, also rendered by Ianos and Heller (2006).

b) Meaning of Rural-Urban Continuum

Some sociologists have used the concept of rural-urban continuum to stress the idea that there are no sharp breaking points to be found in the degree or quantity of rural urban differences. Redfield (1947) has given the concept of rural-urban continuum on the basis of his study of Mexican peasants. The rapid process of urbanization through the establishment of industries, urban traits and facilities has decreased the differences between villages and cities (Fig. 3.2).
There are some sociologists who treat rural-urban as dichotomous categories have differentiated the two at various levels including differences in occupational structure, environment, in size of communities, in density of population, in social mobility and direction of migration, in social stratification, and in the systems of social interaction.

A third view regarding rural and urban communities comes from Pocock and Hudson (1978) who believe that, both village and city are the elements of the same civilization and hence neither rural-urban dichotomy nor continuum is meaningful. Rao (2001) has pointed out in the Indian context, that although both village and town form a part of the same civilization characterized by institution of kinship and caste system in pre-British India, there were certain specific institutional forms and organizational ways distinguishing social and cultural life in towns from that of villages. Thus, according to him, rural-urban continuum makes more sense. Ghurye
believes that, urbanization is due to migration of people from village to city and this has an impact on the migrants and their families.

MacIver (1931) remarks that, though the communities are normally divided into rural and urban, the line of demarcation is not always clear cut between these two. There is no sharp demarcation to tell where the city ends and countryside begins. Each village possesses some elements of the city and every city carries some characteristic features of the village.

Mukherjee (1987) has presented a continuum model by considering the degree of urbanization as a useful conceptual tool for understanding rural-urban relations. Sorokin and Zimmerman in their book *Principles of Rural-Urban Sociology* (1929) have stated that, the factors distinguishing rural from urban communities include occupation, size and density of population as well as mobility differentiation and stratification.

c) Models in the Study of Rural-Urban Continuum

The model that includes the variable suburban settlement belong to periurban perimeter is proven by Waugh (2000). The rural-urban continuity is the inclusion of the fringe, through intense transformation of the area exerted by the urban, which permanently alters its functions (Fig. 3.3).

Cloke’s 1979 model of structure of the urban-rural continuum shows how land-use might change with distance from the city (Fig. 3.4). In this model, there is no single typical rural settlement, but rather a spectrum between declining villages in the deep countryside to suburbanized villages and overspill towns in the urban fringe.
The distinction between rural and urban is probably inescapable for descriptive purposes; however, it often implies a dichotomy which encompasses both spatial and sectoral dimensions (Tacoli, 1998). Rural and urban populations are usually defined by a certain size of residence in settlements for all practical purposes such as censuses.
and other similar statistical exercises. Agriculture is assumed to be the principal activity of rural population whereas industrial production and services are thought for the urban. In reality, the ways in which nations define urban and rural can be far more complex. The boundaries of urban settlements are usually more blurred than portrayed administratively; population movement, temporary and seasonal migration, are not reflected in census figures thus making enumerations of rural and urban populations unreliable. Strikingly, a large number of households in urban areas tend to rely on rural resources, and rural populations are increasingly engaged in non-agricultural activities. The definition of urban centers boundary is critical and subjective. In Asia, agricultural and non-agricultural activities are spatially integrated in metropolitan extension areas. Therefore, the distinction between rural and urban has become problematic (Anbumozhi, 2007).

The perceived link between the city and the countryside is evolving rapidly, shifting away from the assumptions of mainstream paradigms to new conceptual landscapes where rural-urban links are being redefined. In this conceptual field, the peri-urban interface is still generally considered as a transitional zone between city and countryside, often described “not a discrete area, but rather a diffuse territory identified by combinations of features and phenomena, generated largely by activities within the urban zone proper” (Nottingham and Liverpool Universities, 1998).

The urban rural interface areas are always difficult to define and, moreover, they are also bound with problems inherent to the conceptualization of both rural and urban worlds. In that context, policies aiming to alleviate poverty are still considering the existence of either rural or urban poverty, while the reality of many regions in developing world suggests that every-day life and livelihood strategies of “multi-spatial households” are increasingly taking place within an integrated rural-urban space (Tacoli, 1998 and Rigg, 1997).
A sharp distinction between rural and urban settlements generally assumes that the livelihoods or the inhabitants can equally be reduced to two main categories: agriculture based in rural areas and manufacture and services based in urban centres. Yet recent research suggests that, even where activities can be described as either urban or rural and are spatially separated, there is always a continued and varied exchange of resources between rural and urban areas. The sectoral interaction consists of rural activities taking place in urban areas (e.g. urban agriculture) or traditionally urban activities as manufacturing and services taking place in rural areas, or even the peri-urban flows to and from rural industries that are spatially concentrated around urban areas (Tacoli, 1998).

C. DELIMITATION OF URBAN FRINGE: APPROACHES, METHODS AND STUDY MODELS

a) Importance of Delimitation of Urban Fringe

Understanding urban growth and change is critical to city planners and resource managers in rapidly changing environments (Knox, 1993; Turner et al., 1993). Evaluating the impact of urban growth on the environment and to understanding the dynamics of complex urban systems involve modeling and simulation which require innovative methodologies and robust techniques. A number of analytical and static urban models have been developed, that are based on diverse theories such as urban geometry, size relationship between cities, economic functions and social and ethnic patterns with respect to city structures. However, these models explain urban expansion and evolving patterns instead of predicting future urban development. For understanding the spatial consequences of urban growth, a dynamic modeling approach is preferred. In Geographical Information Science (GISc.), dynamic modeling has rapidly gained popularity in recent years among urban planners and geographers as an urban simulation tool (Oguz, 2004).
In the regime of the urban theory (as I have mentioned above, for a sustainable development, the areas surrounding the towns must be seen as a whole), liberal economic policy considers that territorial systems developed by means of private capital and partly public capital. This situation is legislated by public administration for ensuring environmental protection and harmonious development of the human settlement system (Stone, 1993), as we shall further notice by analyzing the methods used for the delimitation of the rural-urban fringe (Avram, 2009).

b) Approaches and Methods of Delimiting the Urban Fringe

In order to exemplify the approaches and methods for determining the urban-rural limits, researchers have used the quantification and systematization achieved by Gallent, Andersson, and Bianconi (2006), based on the frequency these instruments are used by experts in the field. Further, provide the detail of most frequent and scientifically important methods, classifying them into thirteen which are follows:

i. Margin of Built-Up Zones: The base principle for settling the inner margin of the fringe is imposed by the margin of the built-up surface, specificity of the urban, while the outer margin is given by the rural area. This method is the most frequently used by Countryside Agency, UK (2002), Bunkerand Halloway – Australia (2001), Foot Italia, Italy (2000), and Urban Planning Act, Japan (1968).

ii. Land Use: This method briefly rendered previously, developed by Weiguo and Tian (2002) and used by ReUrbA, UK and, Olanda and Broughton, UK (1996). It involves the analysis of land use for establishing the margins on the base of the binary pixels principle. If 1 is attributed to the cells where urban predominates and 0 to the cells where rural predominates, then the transition area develops where the values combine and there is also located the rural urban fringe and its margins.
iii. **Transition Zones**: The method that involves the determination of the margins through the empirical analysis of the transition area between urban and rural as a discontinuity /differentiation of the geographical space; the method was used by Hite – USA (1998).

iv. **Metropolitan Zone**: It is the case of Montreal model that uses the functional and structural features of the territorial administrative units within a metropolitan zone for settling the margins of different zones from the studied perimeter.

v. **Inside the Rural**: A less frequent situation, through which the urban functions can be found within a specific rural perimeter due to delocalization; the most used principle is that of the densification of the buildings and built-up surfaces generally (Heimlich and Anderson, 2001).

vi. **Urban Meets Rural**: It is the situation where the urban continuum appeared for a long period and the analysis of the present town infrastructure and of the services offered to population defines the margins of the fringe; a peculiarity of this case is the possible lack of the traditional fringe.

vii. **Pressure Zones**: It is expressed as the urban shadow through which the town exerts pressure upon the neighbouring regions and involves the study of the influence the center and the urban outskirts have upon neighbouring areas through the influence the last one acquires for penetrating the margins.

viii. **Population**: It is an indicator frequently used in different studies of human settlements geography through the analysis of demographic structures and their distribution in space. Such an example is represented by the zones of urban influence established based on the demographic density values (Fig. 3.5). It can be achieved in GIS system using the administrative territories and the
inhabitants’ total number. By means of interpolation and Voronoi analysis there are obtained isolines that limits the areas characterized by different values of the same influence. Consequently, there is achieved an analysis of the dynamics of the parameters during time, but also at present, by superposing different used values (demographic structure, professional and educational structure, inhabitants’ number, number of owned vehicles, etc.) of what the areas making up the metropolitan zone represent.

Fig. 3.5 Zones of Urban Influence by Means of Demographic Density (Voronoi Analysis)
Fig. 3.6 Determination of the Fringe Margins through the Analysis Agricultural Rent vs. Incomes Generated by Rent (after Alonso’s Model, 1986).

(B=rent value before urban extension, C= rent value after extension, UF= fringe margin, R= rent value)

Source: Pacione M., 1999

Fig. 3.7 The Effect of Urban Extension upon Land Value.

(B=land value before urban extension, C= land value after extension UF= fringe margin chosen, A1=land initial price, A2= the price after extension)

Source: Pacione M., 1999
ix. **Territorial-administrative policy:** A decisive factor for establishing the margins of the fringe through the decision power of imposing restrictions for horizontal development or, on the contrary, permissive measures according to the sustainability capacity of the territory. The method may be applied using the model proposed by Alonso (1986), where the limit urban-rural is given by the optimum of the agricultural rent vs. the incomes generated by rents, which may lead to an excessive horizontal extension of the town without a restrictive administrative policy. As it can be noticed in (Fig. 3.6), the increase of the rent value (curve C), on the background of urban extension and of a greater life quality within the fringe, leads to the renunciation at the income generated by agricultural rent in favour of a potential greater income generated by rent. The inner margin of the fringe migrates outward from UF1 to UF2. This method is extremely precise for settling the inner margins, but less accurate for the outer margins, due to the reduced differences of the rural-rural rent.

x. **Economy:** It is the binder of present civilization. Through a restrictive policy meant to preserve the natural areas from the green-yellow belt of the cities, it is determined an increase of the value of the terrains belonging to rural-urban fringe (Fig.3.7). The method involves the utilization of microeconomic principles that helps us determine both the inner and the outer margins of the fringe by analyzing the demand and offer and by monitoring the land price.

xi. **Accessibility:** As a method of studying the fringe limits it refers to the quality, quantity, and distribution of road infrastructure that, due to its nature, maybe a limiting factor for the fringe or an expansion factor on both sides of the access route, as well as along it, due to its capacity of shortening the distances to the working place; for example, railway infrastructure, through the possibility of reducing distances, but only in case there are permanent trains at favourable intervals and regular-established stops; tram/subway lines have the same impact and may be taken into account for settling the margins of the rural-urban fringe.
xii. **Landscape:** As a value of geographical continuity it can be used as a method for determining the spatial territorial limits. The note of the transition dominant landscape raises certain problems as those of the railway lines that introduce the fringe inside the urban space through the corridors they create, imposing the aspect of the fringe landscape.

xiii. **Way of Life:** It is defining in the areas where the margin is subject to certain interferences and where this aspect can be analyzed, because it supposes the presence of a permanent inhabitancy and of a social life expressed at the community level (Avram, 2009).

According to another study of urban encroachment in China by Tian, G. J et al., 2002, it is difficult to judge urban encroachment on cultivated land degree by the area because the study area is not homogenous. So the index is built to study the region disparity of urban encroachment on cultivated land. The equation is as follows:

\[
RI = \frac{CU}{TL} \times 100\%
\]

Where, RI is urban encroachment on cultivated land degree, CU is urban encroachment on cultivated land area of the study area from 1988-2000 and TL is the total area of the study area. The index is classified into six grades.

- Grade 1 is 0≤RI -0.001, where there are fewer towns, lower urbanization and nearly no urban expansion.
- Grade II is 0.001≤RI to 0.1, where there are lower urban expansion and fewer cultivated land loss.
- Grade III is 0.1≤RI to 0.307, where there are a few urban expansion and cultivated land loss.
- Grade IV is 0.307≤RI to 1.105, where there is more urban expansion and more cultivated land loss.
- Grade V is 1.105≤RI to 2.363, where there are larger urban expansion and cultivated land loss.
• Grade VI is RI \( \geq 2.363 \), where there are the largest urban expansion and a great amount of cultivated land loss.

On the basis of these indices urban encroachment pattern can be analyzed and expressed in the form of maps for land use land cover change in a region.

c) Study Models Applicable for Delimitation of Urban Fringe

By applying the theories upon the territorial systems on the base of the aforementioned methods, it resulted a series of models of the fringe positioning and shape. The simplest or the most idealist and descriptive model was given by Burgess (1925), that when the belts display different features and succeed each other concentrically, starting from the town center – residential zone and/or former industrial zone – urban outskirts (which make up the urban perimeter) – suburban zone – periurban zone (which make up the rural-urban fringe zone).


Fig. 3.8 Processing after Burgess Model for Urban Land Use.
He divided cities in a set of concentric circles expanding from the downtown to the suburbs. This representation was built from Burgess' observations of a number of American cities, notably Chicago, for which he provided empirical evidence. The model assumes a relationship between the socio-economic status (mainly income) of households and the distance from the CBD. Further from the CBD, the better the quality of housing, but the longer the commuting time. Thus, accessing better housing is done at the expense of longer commuting times (and costs). According to this mono-centric model (Fig 3.8); a large city can be divided into six concentric zones (Table 3.1).

### Table 3.1 Description of Six Concentric Zones According Burgess Model.

<table>
<thead>
<tr>
<th>Zone</th>
<th>Description</th>
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<tbody>
<tr>
<td>Zone I</td>
<td>Central Business District (CBD) where most of the tertiary employment is located and where the urban transport infrastructure is converging, making this zone the most accessible.</td>
</tr>
<tr>
<td>Zone II</td>
<td>Immediately adjacent to the CBD a zone where many industrial activities locate to take advantage of nearby labor and markets. Further, most transport terminals, namely port sites and railyards, are located adjacent to the central area.</td>
</tr>
<tr>
<td>Zone III</td>
<td>This zone is gradually been reconverted to other uses by expanding manufacturing / industrial activities. It contains the poorest segment of the urban population, notably first generation immigrants living, in the lowest housing conditions.</td>
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<tr>
<td>Zone IV</td>
<td>Residential zone dominated by the working class and those who were able to move away from the previous zone (often second generation immigrants). This zone has the advantage of being located near the major zones of employment (I and II) and thus represents a low cost location for the working class.</td>
</tr>
<tr>
<td>Zone V</td>
<td>This zone represents higher quality housing linked with longer commuting costs.</td>
</tr>
<tr>
<td>Zone VI</td>
<td>Mainly high class and expensive housing in a rural, suburbanized, setting. The commuting costs are the highest. Prior to mass diffusion of the automobile (1930s), most of these settlements were located next to rail stations.</td>
</tr>
</tbody>
</table>

Although the Burgess model is simple and elegant, it has drawn numerous criticisms. The model is too simple and limited in historical and cultural applications up to the 1950s. It is a product of its time. It was developed when American cities were growing very fast in demographic terms and when motorized transportation was still uncommon as most people used public transit. The model was developed for American cities and has limited applicability elsewhere. It has been demonstrated that pre-industrial cities, notably in Europe, did not at all follow the concentric circles model. For instance, in most pre-industrial European cities, the center was much more important than the periphery, notably in terms of social status. The Burgess concentric model is consequently partially inverted. The concentric model assumed a spatial separation of place of work and place of residence, which was not generalized until the twentieth century. However, the Burgess model remains useful as a concept
explaining concentric urban development, as a way to introduce the complexity of urban land use and to explain urban growth in American cities (Rodrigue, et al. 2009).

**Source:** Barcelona Field Studies Centre S.L.

**Fig. 3.9** Hoyts’ Sectoral Model of Urban Land Use

**Fig. 3.10** Hoyts' Sectoral Model Applied (and modified) in England
The Hoyt model was developed in 1939 (Figs. 3.9 and 3.10) by economist Homer Hoyt. He developed the Burgess model further, suggesting that urban settlements’ land uses are modified by their relative accessibility to transport routes. He expanded Burgess’ five zones, adding another three including outlying business districts and dormitory suburbs. This model has land use concentrated in wedges or sectors radiating out from the city centre. For example, factories may be concentrated along a river, canal or road to form a zone of industry. This would attract low-class housing, but repel high-class residential land use. There are three explanations for these land use patterns.

a) **Historical**: The urban area expanded outwards from the original site which is where the city centre is found today.

b) **Economic**: Rents and rates in the CBD became too expensive for people. In the suburbs there was more land and it was cheaper. Only businesses could afford to stay in the CBD, but even they needed to make the most of expensive land by building upwards.

c) **Concentrations of similar land uses**: One part of the urban area may have all the advantages for industrial location so that a lot of factories want to locate there; but few people want to live next door to a factory, so the residential areas are located elsewhere. Planners also prefer this segregation of land uses into definite zones.

The multiple nuclei model was proposed in 1945 by C. Harris and E. Ullman. The model shows that, the cities may grow from not on CBD (Central Business District), but from several independent growth poles, which are termed as ‘nuclei’. The advantages of this model lie in its multi nuclei approach - many sources give slight variants on the model shown in the diagram, since the model is rather flexible and adapts to local situations (the exact positions of the nuclei are not important but
only the basic trends) so it can be modified to match the city under consideration (Fig. 3.11).

**Fig. 3.11 Multiple Nuclei Model of Harris and Ullman.**

**Fig. 3.12 Main and Secondary Urban Poles and the Positioning of the Fringe Types (Montreal Model, 2006)**
The model that emphasizes the best field reality in the analysis of the rural-urban fringe is that of Montreal city. It used the functional and structural features of the territorial-administrative units within a metropolitan zone in order to settle the limits of different zones from the studied perimeter (Fig. 3.12). The model starts from the premises of studying the functions of the main urban pole, of the secondary urban poles and of the rapport between them and the perimeter located between them. It also makes the difference between the fringes of all studied urban centers, as well as of the rural fringe.

The inner margin of the fringe is generally given by the contact with the town built-up surface, through its outskirts, while the outer margin by the contact with the truly rural area. The initially proposed model is a simple model, because it does not include either the suburbs variable included in the perurban as independent human settlements with a greater density of the built-up surfaces or the variable of inclusion of the secondary urban poles within the extended fringe through the externalization of certain functions of the main urban pole.

However, the model allows us a better vision upon the concentricity of the belts and their space succession. Consequently, it may represent a theoretical model for the initiation of the researchers in identifying the aforementioned zones, for a better implementation of territorial planning and a supporting instrument for decision makers.

Models that are more complex prove the difficulty in dealing with the argument because each case is true. At the same time, all these presented models are correct as they represent only a starting point in the analysis of the territorial systems, and especially of the rural-urban fringe. Difficulty consists in precisely determining the zone because its functions are quite diverse and the mixed character between rural and urban persists, aspect derived from the name itself (Avram, 2009).
These classical models, which were all based on North American cities in the first half of the twentieth century, can be applied with some success to cities in other places at other times, for example we saw how the models developed in 1940s and 1950s and modified in 1960s and 1970s. In particular, Burgess' model works well to cities that grew very rapidly, due to massive immigration - a characteristic of many North American cities. One can look at other variants of these models as applied to British cities. Further, one can go on to look at models of cities in the less economically developed countries, such as cities in Asia and Africa.

References


United States Department of Agriculture http://www.usda.gov/

