

## Multiple-Nuclei Model: AP Human Geography Crash Course

Are you an urbanite? Whether you like it or not, you are probably one of the growing numbers of people in the United States who live either in a city or close enough to quickly travel to one. Cities are growing much faster than rural areas, and the dynamics of urban geography are an important subject to know about for the AP Human Geography exam. There are several classic models used to understand and explain the internal structures of cities and urban areas, and we are going to learn about Harris and Ullman's **Multiple-Nuclei Model** in this AP Human Geography study guide.

### What is a City?

Cities are at the center of every advanced society and act as the hub of economic, social and political activities in that area. They have a variety of shapes and functions, and their geography impacts the daily lives of those who live in the city and surrounding areas. All cities provide their residents a variety of services and functions: shopping, manufacturing, transportation, education, medical, and protective services.

Cities evolved over time, and if a city had favorable factors (agriculture, access to water, trade, defense), its population increased. This led to urbanization (rapid growth, and migration to large cities). This increase in urban population resulted in rapid expansion of the city and greater urbanization of the society. After the conclusion of World War II, North America experienced rapid urbanization. There was a need for housing outside of the core urban areas due to growing population and demand. The result was the **suburbanization** of our society. Suburbanization is the movement of people from core urban areas to the outskirts.

If you have ever been to a large city, you may have noticed that they are all laid out differently. The shapes and design of the city are called its urban morphology. Urban morphology studies the form of cities, how they are formed, and attempts to understand its spatial structure by looking at the patterns of its parts. In an attempt to find out more about how the land was used in the city, several researchers developed urban land use models.

### Urban Land Use Models

In the early 1900's, researchers wanted to find out how cities worked. They developed a variety of urban land use models to help describe and explain different types of cities and the neighborhoods that made up the city. It makes sense that scholars at the University of Chicago developed many of these land use models because Chicago was a city that saw rapid growth in the 18th century.

Some of those models like Burgess's [concentric zone model](#) and [Hoyt's sector model](#) asserted that all of the models used to explain urban land use have at their center the **central business district** (CBD). The CBD is found at the heart of every older city and is the area of skyscrapers, business headquarters, and banks.

Spreading out from this intensive economic land use area is a fringe of wholesale and retail businesses, warehouses, transportation terminals, and light industry. The residential area extends outward beyond this ring of activity. Several of these models try to depict the use of this urban area spatially.

A few years after Burgess and Hoyt published their findings, Chicagoan geographers Chauncey Harris and Edward Ullman came up with their own idea of urban land use, the multiple-nuclei model.

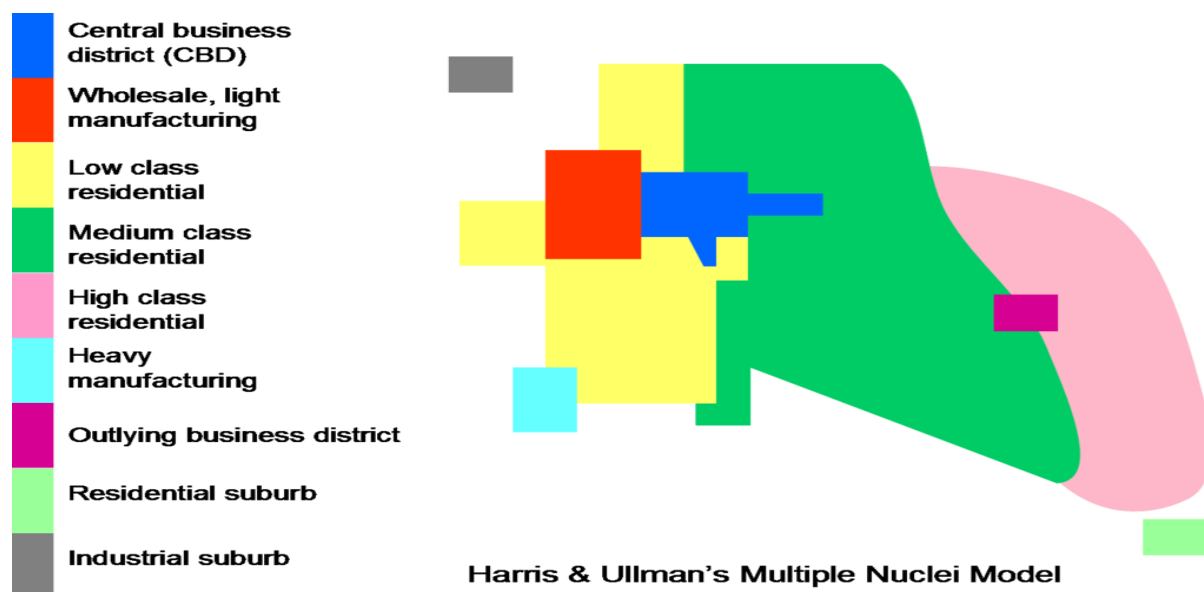
### **Harris and Ullman's Multiple-Nuclei Model**

In 1945, Harris and Ullman developed the multiple-nuclei model. They asserted that the Central Business District (CBD) was no longer the only center of an urban area or city. In earlier models, the CBD was at the core of the urban land use model and was found at the heart of every older city. The CBD is the commercial and business center of the city and in bigger cities, the CBD is often referred to as the "financial district". They were the first to consider the complexity of the city and its surrounding areas.

Harris and Ullman claimed that, in newer cities, automobile-based intraurban dispersal was creating a multiple-nuclei structure of urban land use. This mobility allows for regional centers to specialize the businesses. In the multiple-nuclei, the "nuclei" are multiple smaller growth centers that developed around the metropolitan area. These nuclei can be ports, universities, airports, parks, neighborhoods business, and governmental centers. Their goal was to produce a more realistic model, even at the expense of being more complicated. Their aim in this model was to move away from the concentric zones and better show the complex nature of large urban areas.

The model, to no one's surprise, describes the layout of a city based on Chicago. The multiple-nuclei model illustrates that even though an urban center may have been founded with a CBD, other smaller CBD's evolve on the outskirts of the city near the more high-class housing areas. This allows shorter commutes from the suburbs. This phenomenon creates nodes or nuclei in other parts of the city other than the CBD, thus the name multiple nuclei model.

As multiple nuclei evolve, transportation hubs, are built which allow industries to be established with reduced shipping costs. These transportation hubs have negative by-products, such as noise pollution and lower land values, making land around the hub cheaper. You will find hotels near airports because people who travel want to stay near the source of travel. Housing develops in sections and gets more expensive the farther it is from the CBD.



## **Nodes of the Multiple-Nuclei Model**

### **The Central Business District**

The CBD still exists as the primary nucleus, but multiple small business districts developed, distributed around the metropolitan area. Some of these newer areas compete with the CBD for traditional businesses like banks, real estate and insurance companies. These separate nuclei become specialized and differentiated, reducing the pull of the CBD.

### **Wholesale/Light Manufacturing**

These businesses are more consumer-oriented and near residential areas. Manufacturing goods that need small amounts of raw materials and space develop in this area. Businesses that offer wholesale goods like clothes, furniture and consumer electronics are found in this node.

### **Residential Districts**

Residential neighborhoods of varying status also emerged in nearly random fashion as well, creating “pockets” of housing for both the rich and poor, alongside large zones of lower middle-class housing. There is a sort of randomness to multiple nuclei cities, making the landscape less legible for those not familiar with the city, unlike concentric ring cities that are easy to read by outsiders who have been to other similar cities.

### **Low-Class**

Next to the industrial corridors are the lower- or working-class residential zones. People who live here tend to be factory workers and live in low-income housing. Housing is cheap due to its proximity to industry where pollution, traffic, railroads, and environmental hazards make living conditions poor. Those who live in this sector do so to reduce the cost to commute to work. They are sometimes stereotyped as living on the “other side of the tracks,” and may experience discrimination.

### **Middle-Class**

This residential area is a bit more desirable because it is located further from industry and pollution. People who work in the CBD have access to good transportation lines, making their commute easier. The middle-class sector is the largest residential area.

### **High-Class**

[Hoyt's model](#) also identified an elite zone, for the handful of upper-class people who live in the city. Michigan Avenue was that elite district in Chicago. High-class residential sectors tend to be quiet, clean, and have less traffic than the other ones. There is also a corridor that extends from the CBD to the edge of the city, where you find prime real estate.

In many cities, you will find the high-class district on the west side, where prevailing winds enter the city and are upwind from industrial zones, which are dirty and smelly. It is unlikely that high-class residential housing would be found near factories or lower-class housing areas. In this way, Hoyt's model suggests a distinct physical separation between the wealthy and the poor.

### **Residential Suburb**

These suburbs are usually single-family homes on a small plot of land on the outskirts of the city. They tend to be laid out on roads with cul-de-sacs instead of following the traditional grid pattern.

### **Outlying Business District**

This district competes with the CBD for residents who lived in nearby middle and high-class neighborhoods offering similar services and products as the CBD. Businesses found in this node are malls, airports, colleges and community businesses.

### **Heavy Manufacturing**

This node is occupied by factories that produce material that is heavy like chemicals, steel, industrial machinery. Mining and oil refining industries also can be found in this node.

### **Industrial Suburb**

This is a community created and zoned for industrial sources on the outskirts of the city. Industrial districts in these new cities, unfettered by the need to access rail or water corridors, rely instead on truck freight to receive supplies and to ship products, allowing them to occur anywhere zoning laws permitted. Because industrial zones create pollution, they are located away from residential areas.

### **Multiple-Nuclei Model and the AP Human Geography Exam**

The [AP Human Geography Course Description](#) wants you to use your knowledge of classic urban land use models like the one developed by Harris and Ullman to explain the internal structures of cities and urban development. You should be able to identify the type of neighborhood expected when analyzing the multiple-nuclei model.

You should also know that automobile-based intraurban dispersal was creating a multiple-nuclei structure of urban land use and this mobility allowed for regional centers to specialize their businesses. The “nuclei” in this model are multiple smaller growth centers that developed around the metropolitan area.

### **Conclusion**

Urban land use models were developed to explain different types of cities and the neighborhoods that made up the city and how each of the areas functioned. But the contemporary metropolis has spilled out of its central-city confines in the second half of the 20th century, and these models are no longer capable of accommodating a new urban reality in which the suburbs are the essence of the American city.

The Multiple-Nuclei Model does still provide a good interpretation of the land-use organization of today using multiple nodes to illustrate how the urban land is used. The CBD is no longer at the center of the action, but multiple business districts develop to support the outlying areas of the city. Knowing how to classify types of areas using classic models is an important part of the study of cities in AP Human Geography.

# Multiple Nuclei Model

By: Philip Chesney and Will Amsbaugh

# The Model

1. The multiple nuclei model is an economical model created by Chauncy Harris and Edward Ullman in 1945
2. This model describes the layout of a city, it is based off of Chicago
3. It says even though a city may have begun with a CBD, it will have other smaller CBDs develop on the outskirts of the city
4. If other CBDs develop on the outskirts of a city they would be around valuable housing areas to allow shorter commutes to the outskirts of the city

# Effects on Industry

1. As multiple nuclei develop, certain types of transportations like airports are created
2. Those allow industries to be established with a reduction in transportation cost
3. These transportation hubs have negative effects
4. Some effects are noise pollution and lower land values
5. Hotels are also built around airports because people who travel want to be near their source of transportation

# Reasons for the Model

1. Harris and Ullman argued that cities don't grow a single nucleus but several separate nuclei
2. Each nucleus acts like a growth point
3. The theory was formed based on the idea that people have greater movement due to increased car ownership
4. This increase of movement allows for the specialization of regional centers
5. The number of nuclei around which the city expands depends upon situational as well as historical factors



# Reasons for the Model Continued

1. Certain industrial activities require transportation facilities
2. Various combinations of activities tend to be kept apart
3. Other activities are found together to their mutual advantage
4. Certain facilities need to be placed in a certain area of a city, like the CBD requires convenient traffic systems, and many factories need an abundant source of water
5. Some events benefit from the adjacent distance like positions of factories and residence

# Placement of Classes

1. Low Class: Low class residential area are closer to the manufacturing jobs which tend to to be non-minimal skilled jobs. They also tend to have low wages which in turn lead to a low class residents.
2. Medium Class: Medium class residential area tends to be close to the cbd. It also has more space to spread out to support the population which are doing the skilled-labor jobs.
3. High Class: High class residential areas tend to be on the outskirts of the medium class residential area. The area is also touching the outlying business district. The jobs that the people in this district do are usually skilled labor and have high incomes.

# Fun Facts About The Model

1. This model, unlike some others, takes into account the varied factors of decentralization of North American cities
2. The distance decay theory can still be applied to this model, land value and population density decline with distance from the central places
3. Some criticism about the model: negligence of height of buildings, non-existence of abrupt divisions between zones, unawareness of inertia forces, no consideration of influence of physical relief and government policy, each zones displays a significant degree of internal heterogeneity and not homogeneity

## Harris and Ullman's Multiple Nuclei Model



**THEORIES OF URBAN MORPHOLOGY****Component-I(A) - Personal Details**

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**Component-I (B) - Description of Module**

<b>Items</b>	<b>Description of Module</b>
Subject Name	Geography
Paper Name	Urban Geography
Module Name/Title	Theories of Urban Morphology
Module Id	URG- 12
Pre-requisites	Urban Morphology, Theories, Internal structure, Burgess, Hoyt, Harris and Ullman
Objectives	To Study about the theories of Urban Morphology
Keywords	Urban Morphology, Internal structure, Burgess, Hoyt, Harris and Ullman, Models

## **Component II - e-Text**

### **Theories of Urban Morphology**

#### **I - Introduction:**

Urban geographers have made important contributions in the field of spatial transformations that have been witnessed by urban landscapes in the material and symbolic aspects during the twentieth and twenty-first centuries. Some of the landmarked attempts in this direction were the analyses of urban morphology done by Burgess, Hoyt, Harris and Ullman. Although cities at present have changed significantly since the models were developed; yet they are frequently cited in debates of urban morphology even if to dismiss their continued relevance. It is true that to a large extent each city possesses a distinctive combination of various types of land uses, but to some degree a common pattern is can be traced. The models provided by Burgess, Hoyt, Harris and Ullman, today are part of the philosophy of urban geography and one needs to discuss them in order to understand the basic foundations of this field.

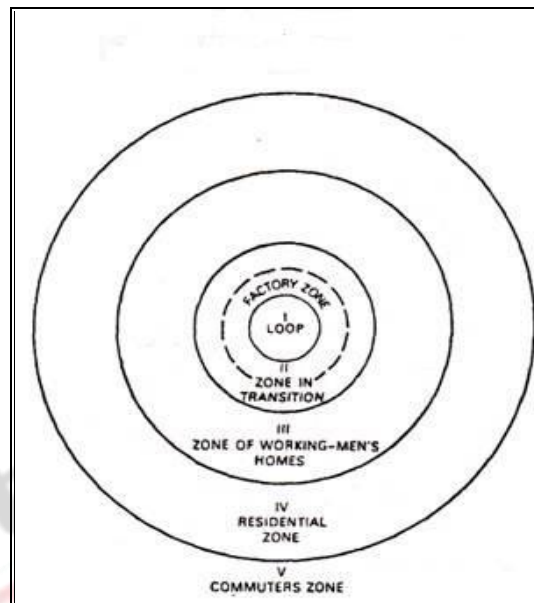
In this module the three theoretical explanations of morphological pattern of a city have been discussed. These are - 1. The Concentric Zone Model 2. The Sector Model and 3. The Multiple Nuclei Model

#### **II - The Concentric Zone Model:**

The concentric zone model was devised in 1923 by E.W. Burgess based on his extensive and detailed case studies on Chicago and its various neighbourhood. His model is radiating out from the Central Business District and represents increasing degrees of cultural assimilation with greater economic and social status through each successive residential zone. In the words of Duncan (1996) the zonal model became a significant and long standing representation of the North American city especially to study the correlation of social and spatial distance among the various classes of the society.

Before understanding the Burgess's model of Concentric Zone one has to study the tendency of the city to expand. In the words of Park (1925) the typical processes of expansion of the city can be best illustrated by a series of numbered concentric circles as shown in Figure 1. In the figure, Zone I '*the Loop*' represents the Central Business District (CBD). Encircling this is an area in transition which is usually surrounded by business and light manufacture (II). The third area (III) is inhabited by the workers in industries who have escaped from the area of deterioration (II) and have the desire to live within easy access of

their work. Next is the residential area (IV) of high class apartment buildings or a district of single family dwellings. Zone V is beyond the city limit – the commuter zone comprising of satellite cities or suburban areas; within a thirty to sixty minute ride of the CBD. And each inner zone has the tendency to extend its area by the invasion of the next outer zone. This basically deals with the physical growth of the city and with the extension of the technical services that make city life liveable, comfortable and luxurious.



**Figure 1: The Growth of the City**

Source: N. R. Fyfe and J.T. Kenny (2005) *The Urban geography Reader*, Routledge, London, pp. 22.

Burgess through his model presented an image of progressive movement as residents of the inner city had a tendency of moving outward to zones of better environmental conditions. According to him, the American city should take the form of five zones. These zones are:

**Zone I** as Central Business District (CBD), the focus of the city's social, commercial and civic life. CBD is also the focus of transportation. Burgess identifies its two parts:

(i) the downtown retail district, and (ii) the wholesale business district encircling the downtown.

**Zone II** is the 'zone in transition' surrounding the CBD. It is a zone of residential deterioration of older private houses consisting of largely subdivided dwelling units. The transition area is occupied by immigrants and infested by 'vices'. In this zone rotten business and light manufacturing from Zone I encroaches upon residential areas. Some of the parts of

this zone are likely to be found in the city's slums or areas of poverty and crime. In other words, this is a zone with submerged regions of poverty, degradation and disease and their underworlds of crime and vice.



**Figure 2: Concentric Zone Theory**

Source: N.R.Fyfe and J.T. Kenny (2005) *The Urban geography Reader*, Routledge, London, pp. 24.

**Zone III** is the third ring made up of the houses of 'workingmen's homes'. This is predominately inhabited by factory and shop workers who are skilled and thrifty. In other words, this is the zone of old residential buildings occupied by stable social groups of working class families. These are families of people who have moved out of Zone II to live near their place of work. This is an area of second immigrant settlement, generally of the second generation. It is the region of escape from the slum.

**Zone IV** is the zone with concentric space still farther from the centre and is occupied by spacious dwellings. In Chicago this was dominated by middle-class groups of native-born Americans. The people residing in this zone are likely to be proprietors of small businesses, professional people, clerks and salesmen.

**Zone V** is far from the city centre; it is almost at the distance of one hour's travelling time. This zone may still be an open country. Most of the people of this zone seem to commute daily for their livelihood in the CBD.



### **Criticism of the Concentric Theory:**

Burgess' theory is popular and widely used by current authors with a few modifications. But the concentric zonal theory is severely criticized on the grounds of local topographical features which affect the location of residential areas. This type of criticism seems invalid because Burgess himself pointed out those zonal distortions may result from variations in relief features. Davie (1972) is the most active critic of the theory who criticised the theory on following grounds:

- (i) CBD's size is irregular; it is often rectangular than circular,
- (ii) Areas of commerce and business usually extend radially along streets from the CBD,
- (iii) Industrial units lie along lines of transportation, near water or rail network
- (iv) Usually there is low-grade housing near industrial and transportation areas in every zone, and
- (v) Finally, concentric zoning of Burgess lacks universal pattern.

The critics of Burgess's theory emphasize that the theory is not appropriate in case of its treatment of wholesaling activity. Similarly, heavy industry in the modern city does not take the form of concentric belt just outside the CBD, instead, it tends to form wedge s like areas along transportation lines.

In the historical context too, the theory of Burgess seems weak. The cultural areas along with buildings, streets and railroads developed during historical phases do not easily change their location. The theory was particular in time and place, and by the late 20th century it was outdated and limited only to large Western industrial cities.

Sjoberg (1960) negated the concentric scheme for the 'pre-industrial city' in which privileged classes – the elite, gather at the centre because of governmental and religious buildings' nearness. In feudal cities, religion and politics had far more status than the economic – the main market of the centre being subsidiary to religious and political structures.

### **Merits of the Concentric Theory**

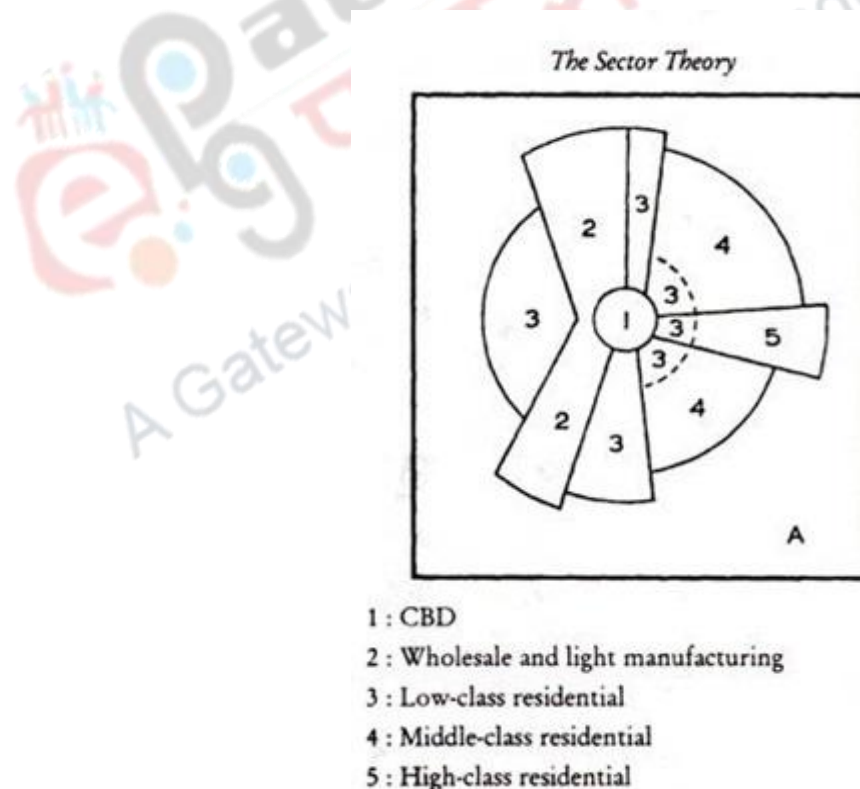
Quinn (1950) the chief supporter of the Burgess theory, says common-sense observations tend to confirm the theory. Urban-gradients' researchers indicate the probability of the concentric structure around the dominant retail area in various cities.

Local irregularities may violate the symmetry of concentric ones, yet Quinn opined that most cities conformed at least roughly to the Burgess pattern. Haggett and Chorley

(1965) too had appreciation about the contribution of Burgess's model which according to them was a normative model, 'a simplified structuring of reality presenting supposedly significant features of relationships in a generalized form.' To conclude, Burgess' model was plainly introduced to illustrate the expansion of the city in its comprehensible manner by a series of concentric zones.

## II. The Sector Theory:

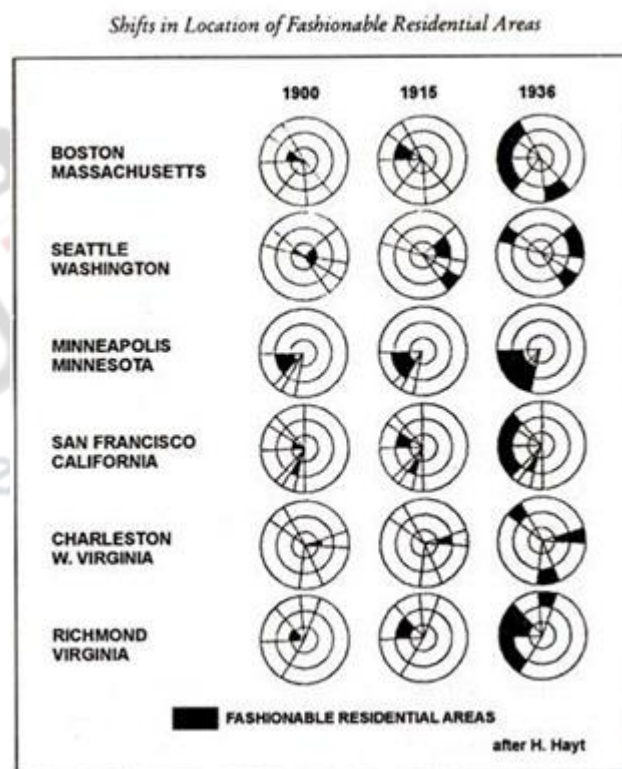
The Concentric theory of Burgess was based on the morphology of American cities in 1920s. Homer Hoyt observed that the structure of cities had changed and therefore, he propounded the sector theory in 1939. He emphasizes on the ribbons of development that extended along commercial streets leading out of the central business district and the tendency of industrial establishments to concentrate along railroad lines and rivers. He further notes the existence of poor and middle-income housing along the rich residential areas in the peripheries of the cities. He opined that the internal structure of the American cities was more axial than concentric resulting in the formation of different sectors. In other words, as the city grows, activities expand outward in a wedge or an axis or a sector from the centre (Figure 3).



**Figure 3: The Sector Theory**

Source: S. Ghosh (2008) *Introduction to Settlement Geography*, Orient Blackswan, Kolkata, pp. 108.

Hoyt's theory, deals only with residential land use; the other types of land uses are considered because of their influence upon the residential areas of the city. Rent areas in cities tend to conform to a pattern of sectors rather than of concentric circles. (Figure 4). The highest rent areas tend to be located in one or more sectors of the city. But various rent areas are not static. High quality residential areas tend to migrate outward in the sector, older houses remaining behind to become medium-quality areas. Hoyt stated that the sector theory is of fundamental importance in analysing neighbourhoods especially in the American cities for locating markets for retail sales. The high rent neighbourhoods of a city do not skip about at random in the process of movement—they follow a definite path in one or more sectors of the city. No city conforms to the ideal pattern but the general figure is useful as in American cities the different types of residential areas tend to grow outward along rather distinct radii and the new growth on the arc of a given sector tends to take on the character of the initial growth of that particular sector (Figure 4).



**Figure 4: Shift in the Location of Fashionable Residential Areas**

Source: N.R.Fyfe and J.T. Kenny (2005) *The Urban geography Reader*, Routledge, London, pp. 30.

Hoyt's theory is based on a vast amount of empirical work. The data for the theory were collected for 64 cities in America by the Works Progress Administration. The data of these small and medium-sized cities were supplemented with surveys of New York, Chicago,

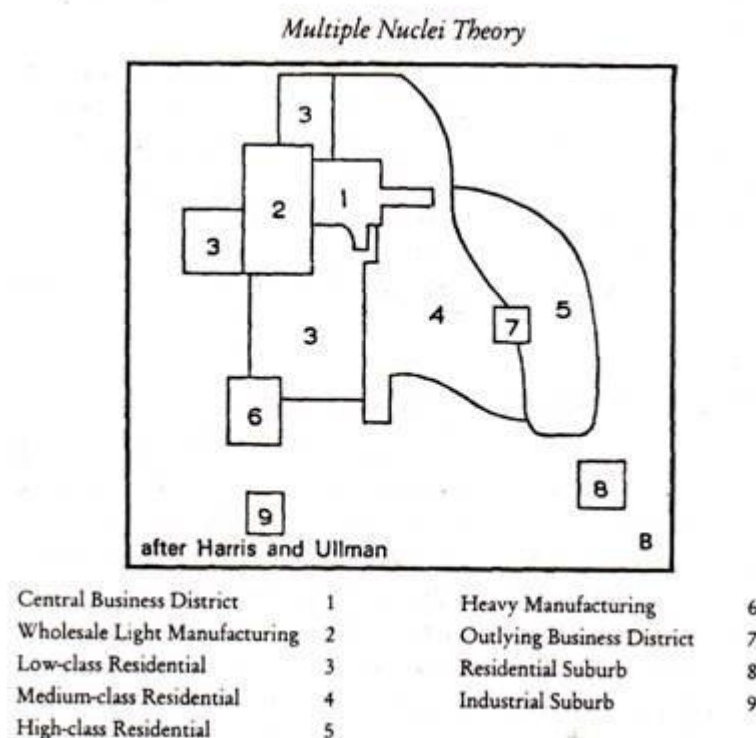
Detroit, Washington and Philadelphia. Thus, it amounts in large part, to empirical generalizations. Nevertheless, the theory has not gone unchallenged.

### Criticism of Hoyt's Theory:

Walter Firey (1945) carried out a land use study of central Boston. In his study he explored the role of social factors in shaping urban land use. On this basis of his survey, he contradicted various aspects of sector theory. He opines that there is little validity of comparing the internal structure of number of cities when physical features like relief, location on a waterfront and other factors affect the pattern of some cities. He also criticised that Hoyt has not sufficiently considered the roles of cultural and social characteristics in conditioning land use. Wealthy residents can choose to live anywhere and may not follow the 'normal' i.e either sector or concentric pattern.

### III. The Multiple Nuclei Theory:

Harris and Ullman (1945) brought together their work on central place theory and classification of cities respectively to represent a metropolitan area that was not defined by distances from the central business district but was based on patterns of land-use of the surrounding areas of the CBD. They suggested multiple nuclei model for accommodating growth of residential, business, industrial or other elements taking place in cities during the course of time from their inception to the present day (Figure 5).



**Figure 5: Multiple Nuclei Theory**

Source: S. Ghosh (2008) *Introduction to Settlement Geography*, Orient Blackswan, Kolkata, pp. 108.

Harris and Ullman unlike Burgess and Hoyt stressed upon the development of special purpose districts instead of social differentiation of residential areas. These districts were nodes of economic activity that needed specialized facilities and benefitted from agglomeration economies of different activities centred there. The rise of such special districts or nuclei was due to various factors which influence the distribution of human activities within a city. These factors are of four categories:

- (a) Certain activities require specialized facilities, for example, CBD can function at the point where maximum accessibility is available.
- (b) There are also group of activities which prefer cohesion. Clothing industry is clustered in the densely packed inner districts of large cities. They profit from cohesion.
- (c) Certain activities are detrimental to one another, and generally seek separate sites. For example, heavy industry and high-class residential areas do not prefer to be near-neighbours.
- (d) Certain activities are unable to pay the rents of most desirable sites: residential areas of low-income residents or bulk storage facilities have to seek nuclei in remote corners.

The above factors along with social, cultural and economic characteristics provide a peculiar urban landscape with separate nodes. Moreover, this theory reveals two significant observations based on historical and site elements of morphology. One is that the theory produces a model involving complexities of urban structure which may not be easily and immediately discernible because of historical stratification of land uses during the process of urban growth. Although most cities have only one CBD they have a series of sub-centres around nuclei. These are less specialized but enough to provide needs of smaller sections of the city.

Second observation which is more significant is about the probability of elements of the concentric and sector models present in its depth. Nothing new is involved conceptually in the multiple nuclei, and, it should not be given the status of a theory. Therefore, multiple nuclei theory should be looked upon as an approach which guides to think about the structure of the city, rather than as a rigid generalization about urban form.





# Ecological Models of Urban Form: Concentric Zone Model, the Sector Model, and the Multiple Nuclei Model

KENT SCHWIRIAN

Ecological models of urban form describe and explain the spatial patterns taken by the distribution of people, buildings, and activities across a city's terrain. This orderly set of spatial arrangements is known as the city's land use pattern or spatial form. Through the years ecological researchers have identified three major models of the geometry of city form: concentric zone, sector, and multiple nuclei. While the three models are conceptually distinct, in the actual development of most cities various elements from the three models become uniquely combined into a spatial pattern that gives each city its own individual spatial geometry. Each of the three models was developed to explain urban morphology in industrial cities of the twentieth century. The concentric zone model was presented by Ernest Burgess in 1925. The sector (Hoyt 1939) and multiple nuclei (Harris & Ullman 1945) models were presented later as alternatives to the concentric zone model. Through time the three have become intellectually linked and widely considered as "the classic models of urban land use." They are "classic" in the sense that the three models have stood the test of time and have proven to be catalysts of research on cities in both developed and developing societies.

The three models share common assumptions: (1) that the city is growing in population and expanding in economic activities; (2) a relatively free land market that is responsive to the economic principles of supply and demand with little in the way of government regulation; (3) an economic base that is mainly a mix of industrial-commercial activities; (4) private ownership of property; (5) specialization in land use; (6) a

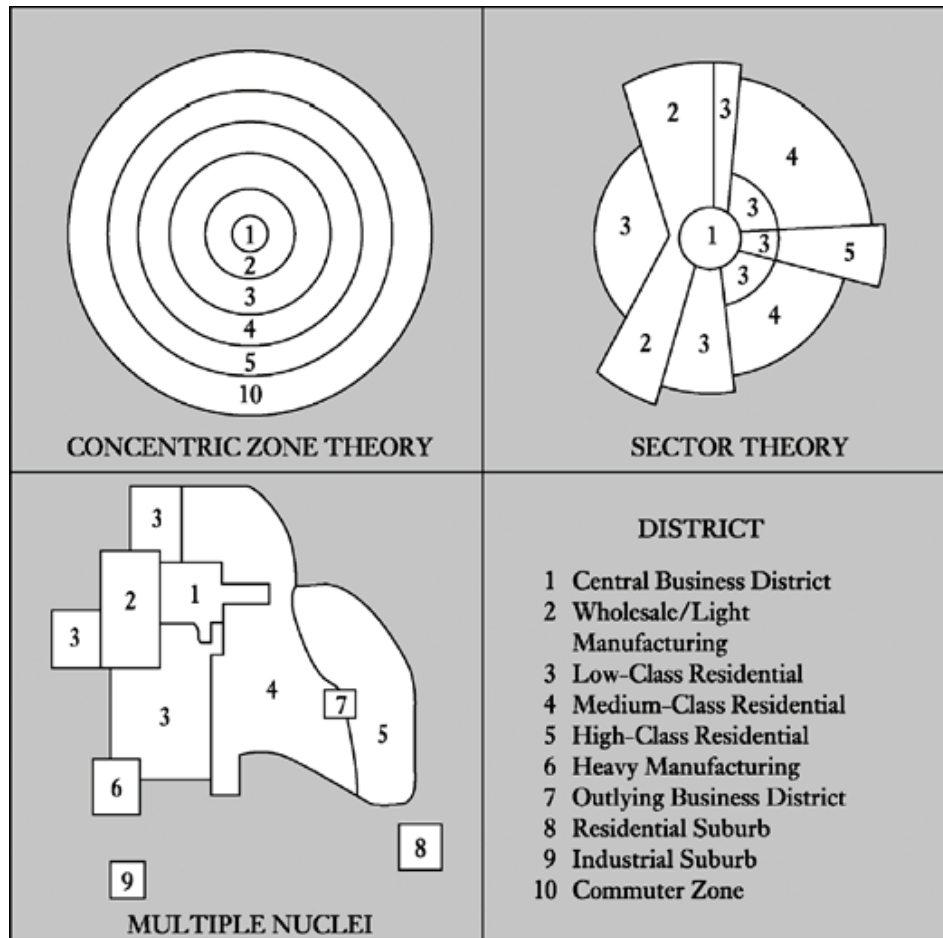
transportation system that is fairly rapid and efficient, and generally available in terms of cost to the majority of the population; and (7) freedom of residential choice, at least for the higher socioeconomic strata. Even though sharing these assumptions, the three models predict different spatial geometries (see figure 1).

## Concentric Zone Model

For the Chicago School sociologists (1914–45), Chicago was the prototypical growing industrial city. What was true for Chicago, they argued, was true for most others. Chicago was both their window on city life and their laboratory for community study. The concentric zone model described Chicago, they argued, and, in essence, described other cities as well.

The concentric zone model, attributed to Ernest Burgess, posits a city undergoing rapid population and economic growth. As different population groups, industrial enterprises, and organizations come to the city, an enormous land market competition develops for highly prized locations. The groups with the most available resources (e.g., business and industry, the upper class) are able to obtain the locations they desire while those with fewer resources (e.g., impoverished immigrant groups) have to make do elsewhere. In 1929 Robert Park called the city, through the operation of its land market, a "great sifting and sorting mechanism ... so that every individual finds, eventually, either the place where he can, or the place where he must live" (Park 1952: 79).

Central location is valued most highly since the old industrial city had but one vital downtown center. Central location minimizes transportation costs to all other locations in the city. Consequently, land values at the city's center soar and can only be afforded by the most resource-laden groups – typically, business and industry. The *central business district* (CBD) forms the organizing node of the city and is identified as Zone I of the model. It includes banks and other financial institutions, corporate offices and headquarters, large department stores and specialized retailers, museums, hotels and night clubs, bars



**Figure 1** Classic models of urban spatial geometry

and restaurants, theaters and other entertainment venues, and government administrative offices.

Zone 2, the *zone in transition*, is located around the CBD on all sides. It is in the process of shifting from residential to industrial-commercial land uses as the growing CBD spills its various activities into it. It is an area of intense land speculation and profit-taking by property owners. The area's increasing blight and deterioration drive out the middle- and working-class residents. Their leaving makes the zone an available place of residence for those groups that cannot obtain housing elsewhere – the segregated racial and ethnic minorities, the socially stigmatized, the downwardly mobile, and those seeking impersonality, anonymity, and seclusion. Slums, prostitution,

crime, mental and physical illness, and the drug war flourish in the zone in transition. It is a socially distressed area inhabited by socially distressed individuals.

Just beyond the zone in transition is found Zone III, the *zone of workingmen's homes*. It is a blue-collar neighborhood inhabited by stable families where "respectability" is a driving ethos. The housing is neat and tidy and the residents are alert and "on guard" against incursions of minorities from the zone in transition. Residential invasions of the poor and ethnic minorities are usually met with resistance. Block-busting realtors operate in the zone to open housing opportunities for those minority group members moving up socioeconomically and



out spatially. Once a “tipping point” has been reached and immigrating minorities flood the zone, the working-class residents flee further out, typically into the adjacent Zone IV, the *zone of better residences*, which houses the middle class. In turn, the middle class moves further out in response to the perceived downgrading of its neighborhoods by the newcomers. It relocates to the next adjacent zone, the *commuters’ zone*, which at one time housed the city’s upper crust. Later Burgess identified two additional zones in the metropolis – the agricultural districts and the metropolitan hinterland (Burgess 1930)

The shifting of people and activities from one zone to another according to this model resembles the pattern that is observed when a pebble is tossed into a lake. The concentric ripples it creates follow and run into each other in their outward rush. The turnover rate of urban neighborhoods from one population type or activity type to another is governed by several factors. First is the rate of growth in people and activities that demand housing or buildings. Second is the rate of construction of dwellings, industrial buildings, and commercial confines. Third is the investment decisions made by developers, financial institutions, and political regimes. If construction lags behind population and economic growth, stagnation and the piling up of people and activities take place. Demand for developed land increases and the prices for developed parcels escalate. If construction exceeds population and economic growth, vacancy rates rise and land prices decline, but new opportunities are created that may serve to attract future growth. Or, in the extreme, with high vacancies and little growth, a collapse of the local development economy may take place which sends the city into economic depression.

### Sector Model

On the basis of studying 142 American cities, Homer Hoyt (1939) argued that, contrary to the concentric zone model, the city’s urban geometry is better described by a sector pattern of land development. The distributions of rents and the city’s socioeconomic status groups are organized in homogeneous, pie-shaped wedges or sectors that run from the city’s CBD to the periphery. The

characteristic land use, activity mix, and population composition for any sector are different from those sectors adjacent to it. The implication is that if one were to drive from the CBD to the periphery while remaining in the same sector, one would remain in generally the same type of land use, resident population composition, and activity mix. The concentric zone model provides the driver with a much different view of the city. As one travels from the CBD to the periphery, regardless of direction, one passes through the same gradation of an ever-increasing status composition of neighborhoods.

The sector model is based on an axial conception of the city. It incorporates Richard Hurd’s (1924 [1903]) idea that growth and development first take place along main transportation routes from the city’s center to the hinterland; these include rail lines, highways, and navigable bodies of water. At some point, it becomes cheaper in travel time and money to develop the open land between the axes than to continue the outward push along the axes. As the area between the axes becomes filled, another cycle begins with development shifting to the axes again and pushing out along them into the undeveloped hinterland.

In a city with a sector spatial geometry, sectors of industry, warehousing, and poor-quality land tend to be surrounded by sectors of low-income and working-class residents. Middle-class housing sectors tend to buffer those of upper status from the sectors of low income, industry, and noxious activities. The high-status populations command the most desirable sites in the city. The high-rent sectors tend to occupy high ground that is free from risk of floods and deluxe apartment areas tend to be established near the business centers in old established residential areas. Low-rent areas and the areas occupied by the poor and marginalized race and ethnic groups tend to be located on the opposite side of the city from the high-income sector.

The location and movement of the sectors occupied by the wealthy and upper socioeconomic groups have a major impact on the location of the other sectors. Hoyt’s model argues that high-rent residential growth tends to proceed from its given point of origin along established lines of travel or toward another existing nucleus or trade area. The high-rent sectors tend to spread along lake, bay, river, and ocean ports where the waterfronts

are non-industrial. High-rent residential districts tend to grow toward open country, away from “dead-end” sectors that prevent expansion by natural or artificial barriers, and toward the homes of the community leaders. The growth of high-rent neighborhoods continues in the same direction for a long time. Real estate developers may bend the direction of high-grade residential growth, but they cannot negate or reverse the effects of the general principles embodied in the model.

### Multiple Nuclei Model

Unlike the other models, the multiple nuclei model of Chauncy Harris and Edward Ullman (1945) does not view the city as being organized around the CBD. Rather, it postulates that there are a number of different growth nuclei, each of which exerts influences on the distribution of people, activities, and land uses. Each nucleus specializes in markedly different activities, ranging from retailing through manufacturing, education and health services to residential. Nuclei vary in size. Some are large, such as the industrial sites; other are small, such as a strip shopping center. Thus, the city’s spatial geometry is much like a patchwork quilt of differing nuclei that are not organized around a single center. The CBD is but one of several functionally important nuclei.

The multiple nuclei model uses four basic principles to explain both the emergence of separate nuclei and the change in them through time. (1) Certain activities require specialized facilities located in only one or a few sections of the metropolis, as seen in the case of manufacturing plants requiring large blocks of undeveloped land located near rail lines. (2) Certain like activities profit from adjacent congregation, as seen in the clustering of retail establishments into malls and shopping centers. (3) Certain unlike activities are antagonistic or detrimental to each other, as seen in the case of manufacturing plants and upper-class residential developments. (4) Certain activities are unable to afford the costs of the most desirable locations, as seen in the case of low-income residential areas and high land with a much sought-after view.

The number and mix of nuclei in a city vary greatly. Larger cities have more nuclei than do

smaller places, and they tend to be more specialized in the larger community. For example, a small city may have a retailing nucleus, but in a larger city the separate retail activities may spin out into their own nucleus, as seen in the “diamond” district in New York City. Some nuclei have existed from the origins of the city, as seen in the CBD; others developed as the city grew, such as ethnic enclaves established by arriving immigrant groups, and through urban redevelopment as one land use supplants another, as in the case of an arena project being built on the site of a former prison.

### Models in Combination

In examining the comparative utility of the three models, researchers have found that in many cities socioeconomic status tends to vary by both sector and distance. That is, some sectors tend to contain a larger percentage of the affluent than do others, and there is a general tendency for the socioeconomic standing of neighborhoods to increase with distance from the CBD. Studies have also shown that housing types and values often vary by sector. Regardless of the extent to which a city’s spatial geometry approximates concentric zones or sectors, overlaying the whole pattern tends to be numerous nuclei devoted to such things as educational campuses, medical complexes, race and ethnic group ghettos and enclaves, industrial plants, parks, and historic districts.

In applying the models to other societies, researchers have identified elements of the three models in the geometry of spatial structure of their cities. A main difference between the geometry of cities in developed and developing societies is that in the developing societies, socioeconomic status tends to be inversely related to distance from the core, while in cities in developed societies, status tends to have a direct relationship with distance. Some have suggested that as cities in developing societies increasingly become part of the global network, they experience economic, social, and political changes and those changes are manifest in the transition of their spatial geometries to a pattern consistent with the patterns of cities in developed societies (Schwirian 1983).

Increasingly, researchers have argued that the spatial geometry of post-industrial cities such

as Los Angeles does not conform to the classic models. Their origin lies not in the industrial centralization of the twentieth century as assumed by the classic models, but, rather, in the decentralized and dispersed multicentric metropolitan region of the postmodern age (Dear 2001).

SEE ALSO: Blockbusting; Built Environment; Central Business District; Chicago School; City Planning/Urban Design; Ethnic Enclaves; Exurbs/Edge Cities; New Urbanism; Park, Robert E. and Burgess, Ernest W.; Restrictive Covenants; Suburbs; Urban Ecology; Urban Renewal and Redevelopment

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