

**POPULATION AND
SETTLEMENT GEOGRAPHY****BLOCK****4****SETTLEMENT STRUCTURE AND HIERARCHY****UNIT 13****STRUCTURE AND MORPHOLOGY OF RURAL
SETTLEMENTS**

UNIT 14**STRUCTURE AND MORPHOLOGY OF URBAN
SETTLEMENTS**

UNIT 15**SETTLEMENTS HIERARCHY**

UNIT 16**SETTLEMENTS POLICIES AND PROGRAMMES**

GLOSSARY

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POPULATION AND SETTLEMENT GEOGRAPHY

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-

BLOCK 4: SETTLEMENT STRUCTURE AND HIERARCHY

The study of settlements in the discipline of Geography also involves the analysis of internal structure, external form and areal arrangements both in rural and urban settlements. It also includes policies and programmes related to different aspects of human settlements. Like previous three Blocks, this Block is also divided into four Units that deal with diverse aspects related to settlement structure, morphology, hierarchy and policies and programmes. Let us discuss each unit briefly.

Unit 13: Structure and Morphology of Rural Settlements

In this unit, we will learn about how rural settlement has been defined by various scholars. We will discuss nature, and characteristics of rural settlements. We will also discuss about morphology and hierarchy of rural settlement. Description about characteristic of rural houses in India is presented. External layout of villages and internal layout of rural houses is discussed. An attempt has been made to describe the social morphology of rural settlement in India. We discuss the census categories of rural settlements in India.

Unit 14: Structure and Morphology of Urban Settlements

In this unit, we will learn about definition of urban morphology. We will also discuss the growth and evolution of various schools in urban morphology. A detailed description about the contribution of the Chicago School is presented in the form of Concentric Zone Model, Sector Model, and Multiple Nuclei Model. We will also study dynamics of urban morphology.

Unit 15: Settlement Hierarchy

In this unit, we will learn about factors contributing to hierarchy of settlement. We will also discuss about Central Place Theory given by Christaller and later on modified by Losch. This is followed by Rank Size Rule given by Zipf. An attempt has been made to explain the hierarchy of global city in present day context. In the concluding section settlement hierarchy in Indian context is briefly discussed.

Unit 16: Settlement Policies and Programmes

In this unit, we will learn about policies and programmes related to different aspects of human settlements in India planned and implemented over time. It includes policies and schemes related to infrastructure housing, water supply, road, and sanitation. We will also discuss about SMART and sustainable cities.

Our best wishes are always with you to complete this course successfully.

STRUCTURE AND MORPHOLOGY OF RURAL SETTLEMENTS

Structure

13.1	Introduction	13.8	Internal Layout of Rural Houses
	Expected Learning Outcomes	13.9	Social Morphology of Rural Settlement in India
13.2	What is Rural Settlement?	13.10	Census Categories of Rural Settlements in India
13.3	Nature and Characteristics of Rural Settlements	13.11	Summary
13.4	Morphology of Rural Settlements	13.12	Terminal Questions
	Site and Situation	13.13	Answers
13.5	Hierarchy of Rural Settlements Based on Population	13.14	References and Suggested Further Reading
13.6	External Layout of Villages		
13.7	Rural House Types with Reference to India		

13.1 INTRODUCTION

Food, Shelter and clothing are the three basic human needs. Among them shelter or housing not only protects us from extreme weather conditions, natural calamities and attacks of wild animals, but also influences our immediate environment, hygiene and indicates socio-economic affluence. Thus, housing or shelter is the highest manifestation of human cultural landscape. A group of individual housings together form a cluster or hamlets, which is eventually known as settlements. Every settlement has houses, which are man-made structures, which are used either to live in or work in or to store things in (Bryan, 1933).

As we know; Geography is the study of landscape. Then, the question may arise, why should we discuss about human settlements in Geography? They are not at all nature made, but completely human-made. Human being is the predominant species in the world and almost all ecosystems and landscapes around the world are 'domesticated' by human beings. Landscapes are endowed with various cultural traits closely associated with physical environment. Thus, the term cultural landscape or landscape modified by

human activities became one of the fundamental concepts of Geography. Housing is one of the most crucial components of human cultural landscape.

Human settlement can be divided into two groups- a) Rural and b) Urban, depending on their traits and characteristics. Urban settlements have certain characteristics like a minimum population limit, area, and functional unit and so on; but anything other than urban is called rural. Depending on administrative convenience rural and urban settlements are determined. Traditionally rural settlements are associated with agriculture and natural resources. Thus, whenever we think about a rural settlement we can imagine undulating folds stretching between the clumps of trees marking the borders of each farm house with different crops with different colors and fragrance; Endless vast green pastures dotted with cows and goats. However, the characteristics of rural settlements incorporate more than farms and livestock rearing.

In this unit, we will learn about how rural settlement has been defined by various scholars in section 13.2. In the Section 13.3 we will discuss nature, and characteristics of rural settlements. In the Section 13.4 and 13.5, we will discuss about morphology and hierarchy of rural settlement. In the Section 13.7, description about characteristic of rural houses in India is presented. In the Section 13.6 and 13.8, external layout of villages and internal layout of rural houses is discussed. In the Section 13.9, an attempt has been made to describe the social morphology of rural settlement in India. In the final Section, we discuss the census categories of rural settlements in India.

Expected Learning Outcomes

After studying this unit, you should be able to:

- Define rural settlement;
- Describe nature and characteristics of rural settlements;
- Describe the characteristics of rural houses in India;
- Explain the classification of rural settlements on the basis of size, forms, function, pattern and morphology; and
- Explain the social characteristics and social segregation within Indian villages.

13.2 WHAT IS RURAL SETTLEMENT?

“Rural settlement is a complex entity defined as the description and analysis of the distribution of buildings by which people get attached to the land for the purpose of primary production.” K.H. Stone (1965).

Jordon (1966) criticized K.H. Stone’s definition of settlement and argued that rural settlements are not merely a group of buildings dotted across space, but continuous interactions between structure and process between settlements and environment produce rural settlements or villages. He stressed on the functionality of rural settlement.

A rural settlement is a type of rural locality where rural residents live and engage in production, resulting from interaction of local residents with natural, economic, social and cultural environments. Territorial systems of human-

environment interactions, with structure, pattern and landscape evolution of rural settlement are the fundamental components of rural settlement study. Rural settlements are close to the nature and thus depending on physical landscape, climate and availability of natural resources pattern, type and structure of rural settlements varies. In India, fertile Gangetic plain has numerous compact settlements, whereas in the American Prairies large farms and scattered homesteads are mainly found. In Mountainous regions of the Himalayas, villages are sparsely located and concentrated either in valleys or in water sources. Similarly in desert areas, oasis or rivers offer the suitable sites. Sometime, Highways or transport lines offer favorable condition for rural settlement development. Therefore, Geographers examine settlement features such as buildings, architectural styles, roads, lanes in order to determine their patterns and functional relationships. Thus, a rural settlement has following components- a) site, b) situation, c) area, d) function, e) shape and f) population.

SAQ I

Fill in the blanks with suitable words:

- a) What is a rural settlement?
 - b) Name the components a rural settlement?
 - c) State the factors considered for setting up a rural settlement?
-

13.3 NATURE AND CHARACTERISTICS OF RURAL SETTLEMENTS

Population size and density are the most important characteristics that categorize a settlement either as rural or as urban. The Census of India defines a settlement with minimum 5000 population, and 400 people per sq.km density; and, at least 75 percent of male working population engaged in non-agricultural pursuits as urban. Rest are classified as rural settlements. So, three important characteristics are associated with rural settlements-

- a) low population size,
- b) low density of population and
- c) agriculture as the main economic activity of people. Apart from agriculture, other primary activities like fishing, animal husbandry, mining and quarrying, forest product collection etc. can be the main occupations of the inhabitants. Thus, rural settlements have closer contact with the nature.
- d) Village community displays homogeneity in culture and occupation is mainly hereditary creating social strata known as caste. There is low scope for social mobility. Strong community bonding with joint and extended family system are prevalent here.

13.4 MORPHOLOGY OF RURAL SETTLEMENTS

Morphology means lay-out plan and internal structure of the settlement. Morphology does not only include settled areas or physical space, but also

identifies various components of socio-economic space that directly influence lay-out of a settlement in terms of arrangement of buildings, patterns of streets, fields and functional characteristics of settlements in general. There are two types of morphology- a) physical morphology that includes site and situation of the settlement as well as layout plan, and b) social morphology.

Physical Morphology of a settlement has two components-

- a) Ground Plan that includes arrangement of buildings, market places and street patterns.
- b) Built-up areas or settled areas that are constantly under changes. They form the main nuclei of a settlement and attract maximum functions. According to Doxiadis, Built-up areas have four parts-
 1. Homogenous sector or village core. It consists of central part of the village with village headman or landlord's house, religious site, water body, and inhabited by dominant groups or community.
 2. Transitional zone- This part is inhabited by servicemen like milkmen, washermen, weavers, blacksmiths, goldsmiths and several others. This part is also known as artisan zone and here day to day's economic as well as social interaction happens between the working class and affluent section of the society.
 3. Circulatory part- This is the peripheral part of the village connected with roads and lanes. Here newly migrated people built their new houses.
 4. Special part- schools, temples, farms etc form this part.

Constantinos A. Doxiadis (1913-1975), the lead architect of Islamabad city (1960) is considered as the father of ekistics or science of human settlements. He introduced dimension approach in settlement studies, where room is the smallest unit and urban continent or world city are the highest settlement unit. The second classificatory dimension distinguishes all settlements on the basis of five elements – nature, society, shells, networks and culture. Every human settlement is developed on these five elements-

1. **Natural element-** All human settlements are the part of nature. Thus availability of natural resources, favorable environment play a crucial role in the development of human settlement.
2. **Human interaction** and ability of changing the nature plays second important factor.
3. **Society or community** develops through economic activities and cultural interactions.
4. **Shells or protection** develops in term of physical protection, cultural or heritage protection.
5. **Network** or interaction with other settlements and exchanges of goods, resources and services expand the settlements functional boundary.

(Source: Doxiadis, C. A. 1968. *Ekistics : an introduction to the science of human settlements*. New York: Oxford University Press)

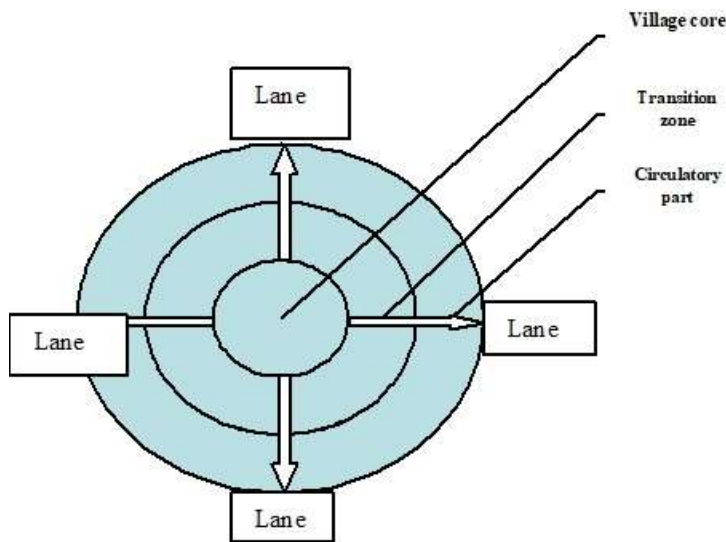


Fig. 13.1: Doxiadis Classification of Rural Morphology

13.4.1 Site and Situation

The words 'site' and 'situation' are two important determining factors, they are not synonymous, but different. Site means the place where a particular settlement is located. Site of a settlement is indicated through latitude, longitude etc. Selection of a site is governed by suitable physical and climatic conditions.

A. Site Factors

Site factors can be clubbed into four broad headings- 1. Physical, 2. Climatic, 3. Economic, and 4. Traditional. Let us discuss each factors briefly.

1) Physical Factors

Do you know the major physical reasons responsible for location of sites? Yes, you are right! it includes aspects, shelter, land & soil and water. Let us discuss them briefly.

a) Aspect- Aspect means direction in which the land faces. In the northern hemisphere south facing slopes receive maximum sunshine and are suitable for agricultural production.

b) Shelter- protects settlements from extreme weather condition. The chalk escarpment of north and South Downs protects British spring line settlements from cold northern winds and prevailing south-westerly winds.

Both aspect and shelter depend on geomorphology of an area. Settlements especially rural settlements are directly depended on natural resources. Thus sunshine, elevation, availability of water protection from extreme weather condition all are necessary.

Rivers and hills play important roles in site selection. In hilly and mountainous areas hill top site, crest site, gap site, foothill site, parallel to contour site and terrace sites are important locational sites for rural settlements.

c) Land and soil- Soil fertility offers ideal site for village development. In Europe villages grew up in rolling lands for avoiding dump and marshy lands.

In South-East Asia villages are located near rivers and water bodies, because paddy cultivation needs water.

d) Water- Though water is essential for survival but excessive water is not good. Therefore, water related sites are of two types-i) Wet point and ii) dry point.

i. Wet Point- In dry climate settlements are found near water points and at ground level. In desert areas, settlement sprung up near oasis or springs.

There are following wet point sites-

1. River confluence site
2. River Bend site
3. Stream side
4. Fording point
5. River island
6. Coastal side
7. Delta site
8. Canal and well side

ii. Dry point- In humid region settlements are found in natural levees (Kolkata for example, situated on a natural levee).

2) Climatic Factors

- a) Ground water
- b) River/ canal
- c) Rainfall
- d) Humidity, temperature

3) Economic Factors

a) Resources like minerals, food, oil etc offer good sites of settlements. California and San Francisco sprung up after discovery of gold mines. In India, Jharia, Jharkhand, Jharkhand etc are mining town.

b) Nodal points- Route centres are nodal points to offer good connectivity. Settlements grow where two valleys meet or roads connect each other. Therefore, nodal points can be transport points. Example- Railway junction- Mughalsarai.

4) Traditional Factors

Before the age of democracy constant warfare and looting compelled human beings to stay together within fortified settlements. Therefore forts offered safety. Even today remnants of fortified settlements are abundant in the world. These forts and castles are often located at strategic points like hill top, cliffs etc. Jaisalmer fort of Rajasthan is one of the few living fort of Asia.

a) Defense- Medieval castles and settlements were built up on hills or cliffs. Edinburgh castle is situated on glacial crag. Ditch or rivers also offer defense. In the late 18th century (1742), Maratha Ditch was constructed around Calcutta and it protected city dwellers from Maratha invasion. People started living near Fort William.

- b) **Bridging point** means confluence of two rivers, and river crossing-ideal for waterway development-Khartoum on Nile River. During earlier days rivers offered cheap and fastest transportation. Therefore, riverine ports offered good settlement sites. In India, Saptagram, Tamralipta etc were port settlements.
- c) **Cultural factors** like temples, mosque, church, universities etc also offer settlement sites. Varanasi, Ujjain etc are temple towns. However, cultural and economic factors alone cannot play role here. Multiple factors determine settlement sites.

B. Situation

There is a close relationship between site and its immediate physical environment. A settlement can be described in relation to other settlements and physical features around it. It is generally linked up with physical and cultural conditions of a much wider area. The main factor that influences situation of a settlement is its accessibility or centrality.

SAQ 2

- Differentiate between site and situation of a settlement?
 - List the factors that are taken into consideration while setting up a settlement?
 - What is the difference between dry point and wet point settlements?
-

13.5 HIERARCHY OF RURAL SETTLEMENTS BASED ON POPULATION

Villages usually have very small population size compared to urban areas. Though there is no minimum population threshold, but for administrative reasons they are treated as a single unit. In India, Mouza or Revenue Villages are administrative units.

Rural settlements are mainly **villages**, **hamlets** and **isolated**. **Hamlet** is a small rural settlement, smaller than a village. It is generally clusters of houses. The word hamlet came from Anglo-Norman settlements of England, where French hamlet formed smallest settlement unit. Hamlet in England means a settlement without a Church. Hamlets have different names in different places.

- In Afghanistan hamlets are called Qala. It is the smallest settlement unit in Afghanistan; it has its own market and mosque.
- In Germany they are called Weiler and villages are called Dorf. In north-west Germany groups of scattered farms are called Bauernschaft.
- In Indonesia they are called Kampung and,
- Osada in Poland
- Clachan in Ireland
- Frazione in Italy
- Dhani in Rajasthan

Villages- The definition of a village differs from country to country. In the USA, villages are intermediate settlements between hamlets and towns. A hamlet is defined there as a settlement with several families with some form of commerce; and a town is settlement that has more than one thousand population. However, in north-east USA, there are big villages with more than thousand population, (Prasad, 2003). The distinction between a hamlet and a village in the west is recent in origin.

In India, the term rural settlement means a revenue village or *Mauza/ Mouza* (1971 Census). Each revenue village has a separate boundary and administrative unit as well as village accounts. Under one revenue village, there are many hamlets, each having different names. This term is also used in Bangladesh and Pakistan. Before 20th century, Pargana was used to denote districts. Therefore, hamlets were grouped into Mouzas and Mouzas were grouped into *Parganas*. The head of the Mouza was called Mauzadar or *Mazumdar*.

SAQ 3

- Differentiate between a village and a hamlet?
- What is a Revenue village and a Mouza?
- Match the following:

A.	Osada	1. Italy
B.	Dhani	2. Poland
C.	Frazione	3. Rajasthan
D.	Qala	4. Afghanistan

13.6 EXTERNAL LAYOUT OF VILLAGES

A. Methods of Determining Types and Pattern of Rural Settlements

Usually topographical maps (1:50000) are used for studying settlements. In the topographical sheets we can easily identify certain types and shapes or pattern of settlements. Some where we can see agglomeration of houses and somewhere we can find dispersed homesteads. Similarly, roads and rivers reveal linear pattern of settlements and tanks or ponds show nucleated settlements along waterbodies. Thus, rural settlements reveal distinct geographical patterns and can be divided into many subcategories. Various statistical methods are used in determining settlement types and patterns. They are Coefficient of dispersion, Index of Concentration, Nearest Neighbor Analysis and Shape Index.

Index of Concentration method was used by French Geographer Albert Demangeon.

$$C = E \cdot N / T$$

C is the coefficient, E is the population of the settlement, N is the number of settlements excluding the chief settlement, T is the total commune population. (Commune is French district). He identified Asia as mainly having compact

villages, North America has dispersed villages, Europe has semi-compact villages and Africa, Australia, and South America have semi-sprinkled villages. He also identified that the factors affecting compactness of settlement are low land with rich fertile soil, and localized water supply. These lands have high carrying capacity. However, rugged hilly terrain and ubiquitous water supply create dispersed settlements.

Index of Concentration developed by *Debouverie* (1943) helps in measuring compactness of a settlement. Its formula is-

$$K = (X * L) / H$$

K = Index of concentration

X = Total number of dwelling units or houses per settlement

L = Total number of settlements in a region

H = Total no of dwelling units or houses in the region

Based on the index value, settlements can be divided into four types-

Sl no	Concentration Index Value	Types of Settlement
1	Index value above 1.50	Compact
2	1.00 to 1.50	Semi-compact
3	0.50 to 1.00	Hamleted
4	Below 0.50	Dispersed

a) Compact Settlement: This type of settlement shows agglomeration of almost all the dwellings of a *Mouza* or village in one place. It may be 30 or 40 hamlets or hundred or thousand houses in one place. They are found mostly in densely populated areas, where houses are built close to each other or concentrated around a resource point like water body etc. (Ahmad, 1952). compact settlements are also called clustered settlements.

b) Semi-Compact Settlement- Here main village is located at the centre and hamlets are connected to the main village by footpaths or cart tracks. Attached hamlets form outgrowth of the main village. Sometimes a section of village community is forced to live away and land owning community occupies the central position (Blach, 1952). In India, different caste-groups live in separate hamlets and they are known as Para, Plali, etc. for example- *Kumarpara* (Potters hamlet), *Tanti para* (weavers hamlet), *Malo para* (fishermen and boatmen's' hamlet).

c) Hamleted settlements are dispersed hamlets found across the Mouza.

d) Dispersed settlement is a settlement type where dwelling units or houses are located scattered, away from each other.

2. Nearest Neighbor Analysis helps in measuring spread and distribution value that tells to what extent the points are clustered or uniformly of something over a geographical space. It gives a numerical space. This technique is used in settlement geography for measuring compactness of settlement.

$$R_n = (Obs)/0.5 \sqrt{a/n}$$

The Nearest Neighbor formula produces a result between 0 to 2.15



Rn value = Nearest Neighbor Value

D (Obs) = Mean observed nearest neighbor distance

a = Area

n = Total number of points

Shape Index- Hagget proposed shape index in 1965. Shape of a village is the result of the ratio of its area and longest internal axis connecting the two outer most point of the parameter.

$$S = 1.27 \text{ A/L}^2$$

A = Area of shape

L = Longest internal axis

Values and shape- three theoretical lattices (Boots, 1978) are identified and based on them following shapes of settlements are determined-

- a) 0.55- triangular
- b) 0.64- square
- c) 0.83- hexagonal

Patterns of rural settlements- Rural settlements reveals following patterns, linear, circular, semi-circular, star shape, triangular, nebular and many others.

1. **Linear pattern** is commonly found along road, railway and streamlines. It may have a single or double row of houses along the main artery. Elongated settlements are found along river banks etc.
2. **Rectangular or square shaped** villages are found near farms, they have grid-like road network, connecting agricultural fields with homesteads. It has another variation- hollow rectangular pattern. When rectangular villages have unbuilt open area in the center, then **hollow rectangular** pattern develops. These open spaces may be sacred grove, fair ground or religious areas or historical ruins etc.
3. **Checkerboard or chess board pattern** is another variation of rectangular settlement. It is developed when road network within the village follow grid like arrangement.
4. **Circular or semi-circular pattern** develops when settlements develop around market places, fair ground or landlord houses or king's palace.
5. **Triangular settlement** develops when topographical barriers like hills etc obstructs growth in one side.
6. **L-shaped settlement** is found along the junction of a main road and a minor track.

7. **Amorphous pattern** develops when the entire village territory is dotted with a number of hamlets or homesteads, all being very small rectangular shaped and connected with the central hamlet through crude path.
8. **Shapeless villages** are also found, they reveal no specific geometric pattern.

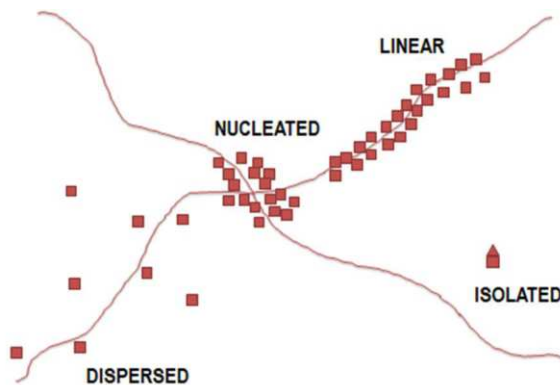


Fig. 13.2: Types of Settlements.

SAQ 4

- What are the statistical methods that help in identifying compactness and distribution of settlements in a geographical area?
- Based on compactness of a settlement what are the major types we found?
- List out the various patterns of rural settlements?

13.7 RURAL HOUSES TYPES WITH REFERENCE TO INDIA

Dwellings are the representation of human imprints on physical landscape, depicting a complex relationship between man-environment relationships. Houses are the products of cultural tradition and natural conditions (Bruhnes, 1920). The word 'Rural dwellings' not only incorporates residential houses, but also incorporates business as well as other buildings like schools, colleges, mosques, temples, chapels etc. Dwellings are building structures; they may be inhabited or vacant. House clusters or agglomeration of houses creates hamlet and it is the beginning of human settlement.

Building materials, shape, size and structure of rural dwellings are determined by climate and availability of natural resources. Log cabins of North American Plains indicate availability of wealth, labor and good transportation. In Japan, wood structures are popular for avoiding earthquake related damages. In India, rural people do not have much resource to build log cabins like the American farmers. So, they rely on local materials like mud, stone, slates etc. In the Eastern zone of India, hay is used as predominant roof materials. Though these local materials are neither durable nor impart good quality, but still poor people use them. A single stroke of natural calamity like cyclone or moderate earthquake can destroy these dwellings.

Shape and size of the buildings also depend on climate. A building has three components, roof, wall and floor. Roof shape and size is directly dependent on climate. Conical shaped roofs are popular in humid areas, where rainfall is abundant. Conical shaped roofs do not allow rainwater to remain on the rooftop for long time and saves the entire building from dampness. Similarly, mud walls are ideal in hot weather, they keep rooms cool during hot summer days. In extreme weather condition, buildings have typical shapes.

Igloos of Tundra region are typically ideal for protecting human beings from cold waves and snow. Inuits and Eskimos use igloo houses in Greenland and Arctic parts of Canada. They use snow to insulate their houses, which are made of whalebones and hides. Igloos have paraboloid shapes for avoiding snowfall and ghastly wind.

Pastoral nomads of Central Asia live in tents, locally known as Yurt (Turkish language) or Ger (Mongolia). These tents are made of animal hides and decorated with lattice works of woods and bamboo for the walls.

13.8 INTERNAL LAYOUT OF RURAL HOUSES

Indian villages too exhibit variation according to climate and geographic location, but usually a North Indian rural house has the following components-

1. **Courtyard or locally known as Angan**, is an rectangular or square shaped open space surrounded on four, three or two sides by rooms or walls. Upper class houses usually have closed courtyards for maintaining privacy, but poor people use it for keeping cattle. Inner rooms do not have good ventilation. So, womenfolk use the courtyard for sun basking during winter and sleeping at night during summer. Courtyards are also used for gathering and harvest related activities as well as favorite place of women to do gossip.
2. **Roofed or thatched varanda** is another important component of a typical rural house. There are two types of *varandas*, inner and outer. a) Outer *varanda* remains attached to the one or two sides of the main door. Men usually use this portion for receiving guests and doing business activities. In poor houses fodder and fuel are kept here along with goats and poultry. Menfolk also sleep here during summer nights and winter days. b) Inner *varanda* extends over the length of the entire courtyard; one, two or three sides and mainly women use this portion. These *varandas* are well supported by mud walls or wooden pillars and their presence provides light to the inner rooms. Sometime, *varandas* are used as storerooms or kitchen.
3. **Raised platform** in front of the main entrance is an essential component of rural house. Since this raised platform faces towards the streets or lanes, so, women seldom use it. The raised platform is connected to the entrance room that connects the main entrance to the inner courtyard. It generally has a stylish door indicating status of the occupant.
4. **Place of cow dung collection-** Cow dung is usually used as fuel in rural India. There is always a hut for collecting, drying and heaping of cow dung.
5. **Rural houses** are either L shaped (three rooms) or U shaped (four rooms).

6. Building materials- In rural areas, poor people use grass, leaves, reeds and bamboo walled houses with thatched roof. Census H-series gives detailed account of building materials used in roof, wall and floor. according to 2011 Census, in rural India 21% houses use Grass, Thatch, Bamboo, Wood, Mud Plastic and polythene in roof, 43% use handmade tiles, machine made tiles, metals, asbestos sheets etc. and 35% use brick, stone, slate and concrete.

More than 63% rural houses use mud, wood and bamboo as floor material, and 34% use burnt brick, cement etc. depending on their economic condition. Based on the type of building material data available from census of India, the houses may be classified in three groups; a) good, b) livable and c) dilapidated.

Ordinary people usually live in two room dwellings, where men and cattle share same rooms. However, rich people have three or four room dwellings.

Apart from economic condition, social identity plays a significant role in housing. Agrarian castes or landowners generally live in 3 or 4 roomed dwellings and they have inner courtyard as well as outer *varanda*, strictly separated for men and women. Upper caste women hardly come outside the inner courtyard. Lower caste people generally live in two roomed dwellings. Untouchables have huts of mud and Thach. Women of these castes can go outside and their houses do not have inner courtyard or *vanranda*. Only outer *varanda* is there, and it is used for multiple purposes like kitchen, sitting parlor, cattle keeping and storing.

Based on construction there are following types of houses-

- a) Kaccha House is built of cheap and locally available materials like mud, slate, bamboo, and grass etc. Economically weaker people live in Kaccha houses.
- b) Pacca houses are built of cement, concrete, burnt bricks, iron beams etc.
- c) Mixed houses or Semi-Pacca- here only the roof material is temporary.

7. Tribal houses in India- Tribal village, houses are different from the mainland villages. In North-East, humidity and rainfall is high, so, houses are generally constructed at a height from the ground. Houses are supported by bamboo structures or wooden pillars. In Nagaland, the front house usually dons a big horn or a cross signifying their hunting background. These houses generally have a hearth for fighting against cold weather. Naga villages are fortified settlements. Bachelor pad or Zawlbuk (Mizoram) is a typical feature of NE villages. Here youngsters are trained in tribal tradition and lifestyle. These bachelor pads are generally located close to the houses of the chieftains. These houses have more open spaces.

In Gujarat, tribes like Banni Meghwal, Maldhari and Rebari, built circular houses with conical roof and placed on a raised platform. The construction is made to avoid whirlwind and breeze. A single pillar supports the roof, which is lined by bamboos inside. The outside wall is covered with dry grass and sometime they add beautiful decorations featuring mirror mosaics on the wall.

In Maharashtra Varli tribe decorate their house with Warli painting. They make their walls with mud and cow dung that imparted a red ochre colored background. A mixture of rice pite, water and gum are used for painting. Meena tribe of Rajasthan also uses paintings to please their Gods.

Toda tribe of Tamilnadu (Ooty) live in tent shaped houses built on a raised platform (10 feet and above). Bamboos are the main building material in Toda hut. They use mural painting at the entrance.

SAQ 5

- a) Name the common components of rural houses in North India?
 - b) List the three types of houses based on construction?
 - c) Fill in the blanks with appropriate words
 - i. Warli painting is found in _____.
 - ii. Circular houses with conical roof are found in _____.
 - iii. Zawlbuk or Bachelor pad is found in _____.
 - iv. Houses with big horn are found in _____. Who made the first attempt to present the functional structure of Indian cities?
-

13.9 SOCIAL MORPHOLOGY OF RURAL SETTLEMENT IN INDIA

However, Indian villages are important from sociological aspect. Villages are the mirrors of Indian society; it is one of the most important socio-political spaces. A village is not only a settlement, but also a 'unit of social structure, cuts across the boundaries of kin and castes and unites a number of unrelated families within an integrated multi-caste community' (Dube, 2006). Every village has its own identity, fixed limits (revenue and forest), village commons and shared resources (tanks, wells etc.). It may have temples; mosques, graveyard, schools and other public places open to all. Indian villages are not self-contained villages, but interconnected with other settlements and have markets as well trade centres.

Ancient Indian text Rig Veda composed in 1500 B.C. approximately mentioned about *Grama* or villages and *Palli* or hamlets. Village is an aggregate of several families or *Kulas* sharing the same habitation. Village headman was called *Gramini*. However, Rig Veda did not specify population limit or size of a settlement, but it stressed on functionality of a village. Kautilya's Arthashastra mentioned about unions of villages and village hierarchies. Even in Gupta period as well as in medieval era, village hierarchy was maintained, but modern village hierarchy was coined during 20th century during British time.

In India, villages are not mere rural settlement, but a community tightly held together on a bondage or sense of belongingness. In villages, few people live in small space, so, they have fellow-feelings, which are otherwise absent in urban areas. Villagers usually depend on natural resources directly and agriculture is their main activity. Dependency on land and strong adherence to

neighborhood encourages joint family system. All the members of a same family live together under the same roof.

Caste system is prevalent in rural India. Separate hamlets are allocated for separate caste-group and people strictly follow caste based occupation. There is little scope of social mobility. For maintaining caste-hierarchy and purity, caste endogamy is strictly in practice. Therefore, **Jajmani system** is prevalent. Under this system members of a caste or many castes offer their services to other castes. People to whom those services are offered are called Jajman, and those who offer they are called Parjans or Kamins. Kamins are paid by food grains annually or half-yearly.

Some well-known scholars have studied Indian villages across regions and highlighted following characteristics:

1. **Spate.O.H.K.** (1952) studied villages of the Deccan Plateau and described that agricultural lands and residential houses are built onto each other or at least they have a continuous common mud wall. Every house has a porch in front of them used as reception room as well as place of drying agricultural produce. Sometime the open space is used as sleeping rooms during hot summer nights and women used to chat when men are out. Cattle pens and granaries are common in those houses. Main services (market, shops, schools, public wells etc.) are located in the main village, but lower caste people or Untouchables live away from the main village forming a sub-village connected to the main village through a narrow pathway. Huts of the untouchables have thick mud walls, low mud porches and roofs made of palm leaves.
2. **Kathleen Gough** (2006) studied a Brahmin village in Tanjore district of Tamilnadu and pointed out that Brhamins are landlord there and other castes served them.
3. **Irawati Karve** (1953) described different types of villages in 20th century India. Villages situated on the high plateau of Deccan were nucleated villages marked by cultivated fields at the border. They have has two types of roads, a) roads connected to other villages and b) roads connecting different parts within the village.

The second type of villages are coastal villages of Konkan coast, they are linear villages strung length wise along the two sides of a road. The houses have fenced coconut and fruit gardens. There is no sharp distinction between cultivated areas and habitation areas. Cashew garden, fruit and coconut gardens are adjacent to houses. It has only one road, the main road along which settlement has grown.

The third type of village he noticed in the north-western part of Maharashtra (Satpura region), here one settlement cluster belongs to one extended family. This type of village has only footpaths, no road. Different clusters are inhabited with different communities or Jatis. Based on caste hierarchy hamlets are arranged accordingly. Low caste people live far away from the main village, this area is called 'Wadi'.

4. **Santibhushan Nandi and D.S. Tyagi** (2006) divide Indian villages into

- Shapeless clusters or agglomerate with streets that form no integral part of a design and they may be dispersed or massive types of settlements. Shapeless clusters are found in Gangetic plain, Malwa and Rajasthan,
- Linear clusters grow along a road forming parallel rows of houses. They are found mainly in the coastal districts of Odisha, Andhra Pradesh, and Gujarat etc.
- Square or rectangular clusters with grid-like formation and interconnected with roads. They are typically found in the dry districts of Rayalseema and Chennai.
- Villages formed with isolated homesteads, they are mainly found in remote areas and treated as villages mainly for administrative convenience.

5. R. B. Mandal (1979)

Continent	Number of Villages	Settlement types	Patterns
Asia	15, 00000	Compact	Rectangular
North America	300000	Dispersed	Farmstead
South America	500000	Semi-sprinkled	Amorphous
Europe	900000	Semi-Compact	Square/ rectangular
Africa	1000000	Semi-sprinkled	Linear
Australia	100000	Semi-sprinkled	Amorphous

(Source: Compiled by R.B. Mandal, 1993)

R.B. Mandal has done a comparative analysis of South Asian settlements and North American settlements. Most part of south and south-east Asia comes under Monsoon climate and Malaysia, Indonesia etc. comes under equatorial climate.



Fig. 13.3: Rural Houses, Uttar Pradesh.

Photos were taken at Barabanki district, UP, by the author during a field survey.



Fig. 13.4: Upper and Lower Cast houses in North Indian Villages.



Fig. 13.5: Village cattle pen, cow-dung storage and grazing land.



Fig. 13.6: Village Road, Sitapur Village, Uttar Pradesh.

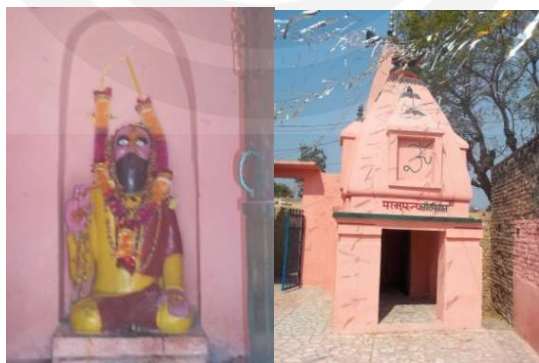


Fig. 13.7: Temple of Village Deity.

SAQ 6

- What is Jajmani system?
 - Describe a Deccan village.
-

13.10 CENSUS CATEGORIES OF RURAL SETTLEMENTS IN INDIA

India has 649481 villages (2011) and in 2001, it had 638,588 villages. In the last decade 2279 new villages came up. Census notifies two types of villages-

- a) **Uninhabited village**, where no household is found. In Uttarakhand, a dozen villages near Rudraprayag town in the Garhwal hills witnessed massive outmigration in the recent decade due to poor connectivity and frequent outbreak of natural calamities. Cham Gudhera, Bilota, Gwar, Bauntha and Barsu villages are now uninhabited villages. Kuldhara of Jaisalmer, Rajasthan is an uninhabited village, which is recently promoted as a tourist spot. It is said that Paliwal Brahmins migrated out from the area due to water crisis and political turmoil, but the real cause is still unknown.
- b) **Inhabited village**, where households and population are found.

Village means **Revenue Village**. A Revenue Village in the Indian Census has following characteristics-

- a) It has a definite name and a survey boundary
- b) Survey boundary comprises hamlets
- c) Unsurveyed areas comprises Forest areas. Each forest Range Officer's Beat is treated as one unit
- d) Census villages can be divided into seven categories depending on their population size, (2011)

Table 13.1: Villages in India on the basis of their size

	Population Size	Percentage of Villages	Percentage of population	Number of Villages
1.	less than 200	-	-	-
2.	200-499	32.95	5.74	3,18,611
3.	500-999	23.73	12.39	1,32,873
4.	1,000-1,999	23.29	23.70	81,911
5.	2,000- 4,999	16.13	34.63	35,992
6.	5,000-9,999	3.12	14.86	4,976
7.	10,000 and above	0.78	8.68	1,358

Highest percentage of village population (34.64%) lives in 2000-4,999 population size villages. Smallest villages or less than 200 population villages are mainly found in Arunachal Pradesh (29.4%), Himachal Pradesh (13.6%) and Meghalaya (12.82%). More than 1000 villages with less than 200 populations are found in Odisha (1371), and Himachal Pradesh (1030). Only 8.68 percent of the total rural population lives in large villages having 10,000 and above population. These villages are common in Bihar, UP, Delhi, Haryana, Kerala, Andhra Pradesh, and Tamil Nadu. These type of villages increased in the last decade (2001-2011), But highest increase is noted in Bihar (630 in 2001 to 1129 in 2011), followed by UP (296 in 2001 to 545 in 2011), West Bengal (354 in 2001 to 416 in 2011), Maharashtra (262 in 2001 to 354 in 2011).

to 310 in 2011). Not a single large village is found in Sikkim, Arunachal Pradesh, Meghalaya, Mizoram, and Andaman and Nicobar Island.

Nagaland shows a decline in large villages, it was 5 in 2001 and now the state has only one village above 10,000 populations. Goa also shows a decline from 3 in 2001 to 1 in 2011. However, Himachal Pradesh always has only one village with above 10,000 populations.

13.11 SUMMARY

Human settlement is broadly divided into rural and urban, depending on their population size and administrative convenience that vary across regions. Rural settlements are mainly settlements based on agriculture activities and primary activities (fishing, mining and quarrying). These settlements are closed to the nature and thus natural aspects play significant role in the situation of these settlements. Rural settlements are mostly found in easily accessible areas like valleys in the mountain regions, river, Lake and spring sites in the arid and semi-arid regions, on embankments in the flood prone areas, near the coast, or riverine alluvial plains where agriculture is easy. However, the favorable site of a settlement largely depends on its function. Thus, a rural settlement has the following components- a) site, b) situation, c) area, d) function, e) shape and f) population. Site of a settlement denotes physical location of a settlement, but situation denotes a settlement's interaction with its site and immediate neighbourhood, or socio-cultural and physical condition of a wider area in respect to a particular settlement. Site of a settlement is governed by a) physical factors (soil condition, nearness of water or sea coast), b) climatic factor (rainfall, groundwater or springs, humidity, temperature), c) economic resources (good connectivity), and traditional factors or strategic locations that helps defense. However, cultural and economic factors alone cannot play role here. Multiple factors determine settlement sites.

Though population is an important factor in case of urban settlement, but rural settlement has no minimum population size. However, depending on population size, rural settlements can be divided into hamlets (smallest settlement units) and villages (larger ones). Hamlets are found isolated in mountainous regions, forests and desert areas. They have different names in different countries (Qala in Afghanistan, Dhani in Rajasthan's Thar Desert, Osada in Poland and Clachan in Ireland). A group of hamlets create a revenue village or Mouza with an administrative boundary. The Census of India categorized villages in two broad categories a) uninhabited villages where no household is found at the present days like Kuldhara in Jaisalmer, and b) inhabited villages where people live. However, population size of a rural settlement varies, and villages with less than 200 people is mostly found in the Himalayas (Himachal Pradesh, Ladakh), north-eastern states like Arunachal Pradesh, Meghalaya and desert areas. Large villages are found (10000 and above) in the Ganga-Yamuna Doab of north-Indian plain.

Rural houses display the local culture and resources of the villagers. Depending on availability of building materials bamboo, woods and stones are used in different regions. As for example, in the east and the north-east India bamboos are commonly used, but in mountainous areas woods and stones

are mostly used. Wooden houses are found in the earthquake prone areas. Houses are built on raised platforms in the marshy lands. Indian rural houses also display social status or caste of the resident. In a typical Indian rural house, an inner courtyard or *Angan* is found where womenfolk spent most of their time. Outer *Varanda* is mainly used by menfolk in receiving guests and sleeping during summer nights. Cowsheds are another integrated feature of Indian houses, along with granaries or storehouses, kitchens etc. Ordinary people have two room dwellings and rich people have four roomed houses. Women folk often decorate the exterior of the houses with traditional paintings revealing geometric patterns, and religious motifs. Mainly three types of houses are found in Indian villages (kuccha house built with temporary materials), *pucca* houses (concrete and brick houses), and semi-permanent materials (roof material is temporary).

Distribution of houses on an area gave shape to a rural settlement. Index of concentration shows compactness of a village settlement, while nearest neighbor analysis reveals geometric pattern. Rural settlements reveal patterns, linear, circular, semi-circular, star shape, triangular, nebular and many other forms. It has been found that hamlets within a village are segregated in caste-line. Untouchables or low caste people live in a separate hamlet away from the main village and connected to the main village through a narrow road. Sometime, one settlement cluster belongs to one extended family and some villages have separate cultivated areas.

13.12 TERMINAL QUESTIONS

1. Explain the role of site and situation in origin and growth of rural settlements
2. Explain how Nearest Neighbor analysis identify pattern of rural settlements.
3. Explain the brief morphology of North and South Indian rural settlements
4. Describe the tribal houses of India.

13.13 ANSWERS

Self-Assessment Questions (SAQ)

1. a) Rural settlements are where the population settles on the land outside the city limits and engage in primary activities like agriculture, pastoral nomadism and others. In some states, settlements are divided into rural and urban categories according to administrative convenience, and other criteria.
b) A rural settlement has following components- a) site, b) situation, c) area, d) function, e) shape and f) population.
c) a) Physical factors like slope inclination with adequate sunshine, shelter from extreme weather conditions like storm or snowfall, protection from external aggression, availability of water, and protection from flood. b) Economic factors like road accessibility and resource harnessing points

- are also considered. c) Some special factors like religious or cultural factors also help in the development of rural settlements.
2. a) The site means the place where a particular settlement is located. Site of a settlement is indicated through latitude, longitude etc. selection of a site is governed by suitable physical and climatic conditions. Situation of a settlement means its relation with its surroundings and immediate environment.
- b) Site factors can be clubbed into four broad headings- 1. Physical, 2. Climatic, 3. Economic, and 4. Traditional.
- c) Water related sites are of two types- a) Wet point and b) dry point. Wet Point- In dry climate settlements are generally found near water points and ground level. In desert areas settlements come up near oasis or springs. Dry point- In humid region settlements are found in natural levees (Kolkata for example, situated on a natural levee).
3. a) Hamlet is a small human settlement with no central place or meeting point. A Group of hamlets form villages.
- b) Revenue village is the smallest administrative region in India defined by a boundary. Each revenue village has a Village administrative officer. One revenue village may have several settlements. A revenue village has two components- a) surveyed areas, b) unsurveyed areas (forest etc.).
- Mouza is an administrative district corresponding to a specific land area within which one or more settlements may be located. This term is usually used in India, Pakistan and Bangladesh. Each mouza has a cadastral map with land revenue records.
- c) A-2; B-3; C-1; D-4
4. a) (i) Index of concentration, (ii) Shape index, (c) Nearest neighbor analysis
- b) Four types - Compact, Semi-Compact, Hamletted, Dispersed settlement
- c) Patterns of rural settlements are Linear pattern, Rectangular or square shaped, Checkerboard or chess board pattern, Circular or semi-circular pattern, Triangular settlement, L-shaped settlement, Amorphous pattern, and Shapeless villages
5. a) Courtyard or angan, Roofed or thatched varanda(a house may have outer varanda for male members' meeting place and inner varanda for women), raised platform, cow dung collection centres and cowsheds.
- b) Kaccha house, Pacca house, and Mixed houses or Semi-Pucca house
- c) i. Maharashtra; Gujarat; iii. North East (Mizoram); iv. Nagaland
6. a) *Jajmani* system is an economic system found in rural India, where various castes perform various kinds of works and services for upper caste people and receive grains in exchange of their work. The main features of this system are that it is a hereditary relationship and payment is in the mode of 'kinds' not in cash.
- b) Villages situated on the high plateau of Deccan are nucleated villages marked by cultivated fields at the border. It has two types of roads, a) roads connected to other villages and b) roads connected different parts within the village.

The second type of villages are coastal villages of Konkan coast, they are linear villages strung length wise along the two sides of a road. The houses have fenced coconut and fruit gardens. There is no sharp distinction between cultivated areas and habitation areas. Cashew garden, fruit and coconut gardens are adjacent to houses. It has only one road, the main road along which settlement has grown.

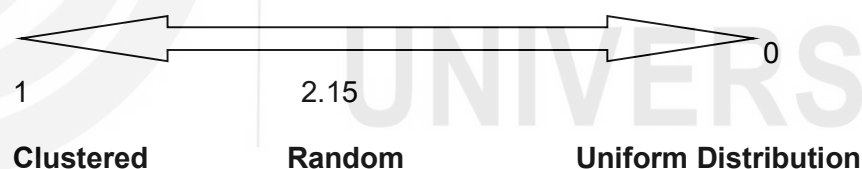
The third type of village are noticed in the north-western part of Maharashtra (Satpura region), here one settlement cluster belongs to one extended family. This type of village has only footpaths, no road. Different clusters are inhabited with different communities or Jatis. Based on caste hierarchy hamlets are arranged accordingly. Low caste people live far away from the main village, this area is called 'Wadi'.

Terminal Questions

1. Site of a settlement denotes physical site where a settlement is located, it directly depends on natural resources and climatic factors; but situation means its relation with other settlements and surroundings. Site of a settlement affects accessibility to natural resources and influences morphology of the settlement and physical boundary. However, situation determines its functional area.
2. Nearest Neighbor Analysis helps in measuring spread and distribution of something over a geographical space. It gives a numerical value that tells to what extent the points are clustered or uniformly spaced. This technique is used in settlement geography for measuring compactness of settlement.

$$R_n = (Obs)/0.5 \sqrt{a/n}$$

The Nearest Neighbor formula produces a result between 0 to 2.15



R_n value = Nearest Neighbor Value

$D (Obs)$ = Mean observed nearest neighbor distance

a = Area

n = Total number of points

3. The main difference between rural houses of the north and south are found in building material and structure of the houses. Northern village houses have several components like inner and outer courtyard, veranda, storehouse, cattleshed, sometime kitchen is found in the inner courtyard and rich houses have four rooms, but ordinary people have two rooms. The building material is straw, stones and tiles; roof shape is conical, but in the dry lands of Punjab and Rajasthan they have flat roofed houses. Similarly in the Deccan villages, roof shape and number of rooms depend on the inhabitants' economic affluence. However, coconut leaves are used here commonly. The main difference between a north and south village morphology is that in the north, agricultural field remained away from the main village, but in the south, cashew plantation, coconut trees, palms are

found adjacent to each house. Both north and south villages have separate hamlets for various caste people and untouchables live away from the main village.

4. Tribal villages are houses are different that mainland villages. In North-East humidity and rainfall is high, so, houses are generally constructed at a height from the ground. Houses are supported by bamboo structures or wooden pillars. In Nagaland, the front house usually dons a big horn or a cross signifying their hunting background. These houses generally have a hearth for fighting against cold weather. Naga villages are fortified settlement. Bachelor pad or Zawlbuk (Mizoram) is a typical feature of NE villages. Here youngsters are trained in tribal tradition and lifestyle. These bachelor pads remain close to the houses of the chieftains. These houses have more open spaces.

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Toda tribe of Tamilnadu (Ooty) live in tent shaped houses built on a raised platform (10 feet and above). Bamboos are the main building material in Toda hut. They use mural painting at the entrance.

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Acknokledments

Fig. 13.5: Photos were taken at a village of Sitapur district, UP, by the author during a field survey.

Fig. 13.6: Photos were taken at a village of Sitapur district, UP, by the author during a field survey.

Fig. 13.7: The author has taken photos at a village temple of Santa Ravidas ji at Nangal Block of Saharanpur District, UP during a field work.

UNIT 14

STRUCTURE AND MORPHOLOGY OF URBAN SETTLEMENT

Structure

14.1	Introduction	14.6	Multiple Nuclei Model
	Expected Learning Outcomes	14.7	Comparison between Theories Related to Urban Morphology
14.2	Definition of urban morphology	14.8	Dynamics of Urban Morphology
14.3	Schools of Urban Morphology		Central Business District (CBD)
	British schools		Retail, Wholesale and Commercial Area
	Italian schools		Industrial Areas
	French school		Residential Areas
	Chicago School		Urban Villages
	Los Angeles School		Slums
14.4	Concentric Zone Model		Census Definition of Slum
	Shortcomings of the Concentric Zone Model	14.9	Summary
	More Developed Countries	14.10	Terminal Questions
	Less Developed / Developing Countries	14.11	Answers
14.5	Sector Model	14.12	References and Further Reading

14.1 INTRODUCTION

In the previous unit, we have already discussed structure and morphology of rural settlement. Urban Morphology simply means the layout of a city which is displayed through the physical map with land use zones. The word layout incorporates physical arrangements of residential houses, market centres, educational institutes, health centres, entertainment and recreation zones, the layout of streets, roads and transport lines along with open spaces. Thus, urban morphology refers to the physical expression of an urban centre on the earth's surface. However, it changes over time. Expansion of cities also changes urban morphology and incorporates urban sprawls and agglomerations. Since time immemorial city structure and morphology underwent rapid evolution with progress in the human civilizations. Earlier

cities were defence oriented; they usually evolved around a castle, manor house and were delineated by walls or moats. However, modern cities have different layouts. Both natural and man-made factors influence urban morphology. Natural factors like climate, topography and building materials play a significant role; similarly, man-made factors like trading points, market centres, defence and strategic points, fortification, transport lines and market centres also influence a city's layout. However, three types of models explain urban morphology systematically. Concentric zone models of Ernest Burgess and Parks, Sector Model of Hoyt and Davis, Multiple Nuclei model of Harris and Ullman explain changes of urban morphology with spatial expansion.

In this unit, we will learn about definition of urban morphology in the section 14.2. In the Section 14.3 we will discuss the growth and evolution of various schools in urban morphology. In the Section 14.4, 14.5 and 14.6 a detailed description about the contribution of the Chicago School is presented in the form of Concentric Zone Model, Sector Model, and Multiple Nuclei Model. In the Section 14.7 a comparative analysis of the above mentioned three models are presented. In the final section i.e., 14.8 we will study dynamics of urban morphology.

an attempt has been made to describe the social characteristics and segregation within Indian villages.

Expected Learning Outcomes

After studying this unit, you should be able to:

- Define urban morphology;
- Describe the growth and evolution of various schools in urban morphology;
- Explain the contribution of the Chicago School and its theories; and
- Analyse theories on urban morphology along with their relevance, weaknesses and applicability in the real world.

14.2 DEFINITION OF URBAN MORPHOLOGY

Urban morphology is the study of human settlements. This term 'morphology' was first used by German poet Johan Wolfgang von Goethe in the 18th century and later it was extensively used in bioscience. Morphology is the study of shape, form, external structure and its arrangement methods (Cortes, 2004).

Scope of Urban Morphology

It incorporates the process of the formation of human settlement and its transformation. Urban morphology includes the study of a city's physical layout and its changes over time or the spatial transformation of a city. Urban morphology is also called the study of urban tissues, which includes neighbourhood morphology (arrangement and distribution of buildings and open spaces). Pattern and ordering of buildings and spaces, functions of these spaces and their changes over time are included under the scope of urban morphology. This field has immense importance in urban planning,

architecture, and infrastructure development. Recently, socio-cultural aspects and their influences on the city's landscape have also been incorporated in urban morphology.

14.3 SCHOOLS OF URBAN MORPHOLOGY

The study of urban morphology developed distinctly under the following schools of thought:

- 1) **British schools:** British school is also known as the Conzenian School because it revolves around the writings of M.R.G. Conzen. The scholars of Conzenian school focus on three components for analysis- a) town plan- It again has three components-street system, block-plans, and plots or street-buildings aggregations. The Conzenian School of thought founded by M R G Conzen flourished in the 19th century based on German scholar Schuler's two papers on the ground plan of towns and the wider aspect of settlement geography (1899). Apart from Schuler's work, the dissertations he supervised at the University of Halle produced several colourful maps of German cities displaying building arrangements and street networks. These works influenced Conzen. He and his colleagues produced micro-scale maps of British cities displaying streets, plots, and block plans of buildings. These maps identified building fabric, land use within a city or town and the process of spatial urban development through spatial transformation of cities. The spatial transformation since the mediaeval period was captured. Another important contribution of this school is the fringe belt and burgrave cycle concept. The fringe belt is the area outside the city limit or periphery or city wall; this area is characterised by irregularity of plots and the existence of rural and urban land use side by side. Fringe belts usually have many open spaces. (Louis, one of the mentors of Conzen used the term Fringe Belt and mapped the fringe belt of Berlin City in 1936.) The Burgrave cycle means '*the progressive filling-in with buildings of the Backland burgages and terminating in the clearing of buildings and period of urban follow before the initiation of a redevelopment cycle*'. Conzen prepared morphological maps of British towns like Alnwick, Newcastle, and Ludlow. (Whitehand, J.W.R., 2001)
- 2) **Italian school** developed in the 1950s under the leadership of architect Saverio Muratori. He introduced the typology of houses in a city. The typology of houses has a close connection with the history and culture of the city dwellers. His works were mainly on Rome and Venice. Later other architects also contributed to this field. However, Italian school gives emphasis mainly on urban architecture but ignores other aspects.
- 3) **French school** also focused initially on architectural models; they are guided by the Versailles School of architecture. However, Henry Lefebvre's idea of the Right to the City concept influenced the urban geographers of the late 1970s; and socio-political and economic dimensions of urban space are incorporated in the French School.
- 4) **Chicago school** produced three enduring models of urban morphology. The first one is concentric zone theory which provides an ecological explanation of city-space. E W Burgess propounded the Concentric Zone

model in his book *The City Growth* (1925); it was followed by the sector theory of urban structure propounded by Hoyt in 1933 and 1939; and lastly, the multiple nuclei theory of Harris and Ulman (1945).

- 5) **Los Angeles school** of urban morphology focuses on the morphology of postmodern or post-Fordist cities. However, this school has several thinkers with several theories which are largely influenced by Marxist urban theories. The main contribution of this school is a multi-centred metropolitan region.

Table 14.1: Contribution of different Schools in the Study of Urban Morphology

Name of the School	Scholars	Main Contribution
British School	M R G Conzen; J W R Whitehand	The developed city layout maps or land use maps of Alnwick, and other British towns. The word townscape is used to define a city's landscape Fringe Belt and Burgage Cycle concept
Italian School	Saverio Muratori	Architecture based development- mainly typology of houses are studied
French School		Started with architecture, but later incorporated socio-political factors in urban studies.
Chicago School	E W Burgess, Hoyt, C. Harris and E. Ulman (1920-1945)	Gave three enduring theories on urban morphology- concentric zone theory, sector model and multiple nuclei theory
Los Angeles School		Urban morphology of global cities and world cities. They developed as the critics of the Chicago school.

SAQ I

Match the following

Name of the School

- a) British School
- b) Italian School
- c) Chicago School

Scholars

- i) E W Burgess
- ii) M R G Conzen
- iii) Saverio Muratori

14.4 CONCENTRIC ZONE MODEL

E. W Burgess published his book *'The growth of the city: an introduction to a research project'* in 1925, this theory was written in a chapter entitled 'The City'. It was one of the earliest theoretical models that explained urban structure or morphology. Urban land use can be divided into five concentric

zones; with the CBD or the Central Business District as its core and commuter zone or residential suburb as its outermost peripheries.

- I. **The Central Business District (CBD)** or the Loop forms the innermost circle. This is the most accessible part of the city, where all commercial activities like trade, business, departmental stores, banks, offices and all tertiary activities are found. This part is mostly non-residential. In New York, CBD or Loop is also known as the Down Town. He claimed that daily half a million people enter and leave the Chicago Loop.
- II. **The Zone of Transition** is surrounded by the CBD with old fashioned private houses which are gradually taken over as offices. This area also has some light industrial or manufacturing units. Migrant workers are attracted to this area due to easy access to the CBD. Poor people and labourers live here in old and dilapidated buildings. These people cannot afford to commute long distances.
- III. **The Zone of Working Men's House-** Here working-class families reside. In Chicago, this area was characterized by two-storied buildings, in which house owners live in the lower story and the upper story is rented out. Tenants are mostly engaged either in the light manufacturing industry or any commercial activities at the CBD. It is the residential zone of the middle-income group.
- IV. **The Zone of Better Residence-** It is a high-class residential zone. Here single-family dwellings are found. Dwellers are mainly engaged in the banking sector, commercial institutions and managerial positions. This zone has houses with vast open spaces or gardens.
- V. **Commuter Zone-** It is the outermost periphery of the city. High-class residences developed here along the Rapid Travel Line. Houses have wide spaces. Rural land use is also found along with urban land use. Automobiles expanded the city limit and rich people can afford to travel long distances.

Burgess's theory stated that all the economic and commercial activities are localized in the city centre. This zone remained surrounded by different class residential zones. Poor people like to live near the CBD because they cannot afford to commute longer distances. Rich people live in the outer periphery. The land rent increases towards the periphery. This concept is called **Bid Rent Curve**.

However, Berry and Horton criticised this theory as crude and unrefined; and too simplistic. Other critics of Burgess's Concentric Zone theory are **M. Alihan, M.R. Davie, Walter Firey** and **R.E. Dickinson**.

14.4.1 Shortcomings of the Concentric Zone Model

This theory is only applicable to American cities, where poor people live in the city core and rich people live in the suburbs. However, with the development of rapid travels like tube rail etc. this model lost its applicability. Poor people could afford to live away from the CBD.

Burgess assumed a city is developed on an isotropic plain. He did not consider physical barriers and relief features like riverfront, mountains or

lakes. He did not even consider urban gentrification and the regeneration of the urban core. Expensive properties can be found in the city core.

Urban politics and globalization create polycentric cities in reality. So, concentric zones do not exist in the real world. This theory is too hypothetical. Burgess also accepted that river or transport lines can change concentric zones into elongated sectors. So, the concept of the Sector Model found its ground.

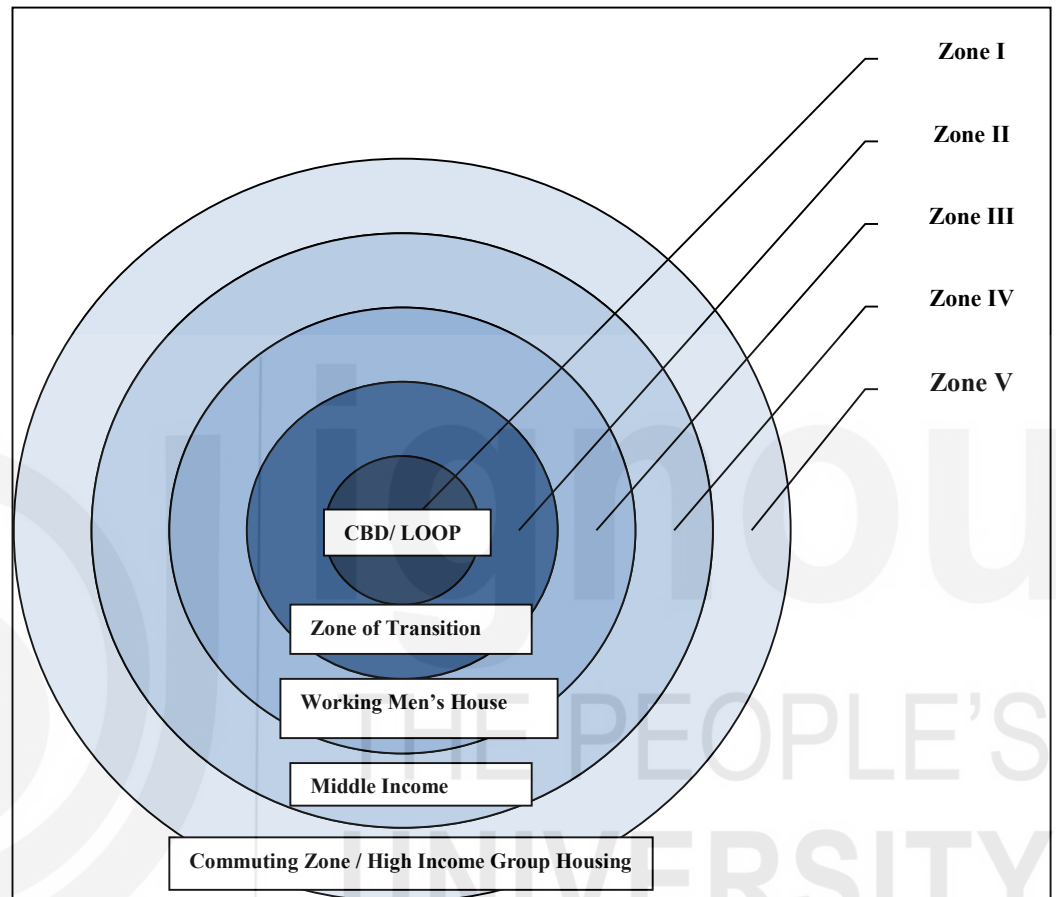


Fig. 14.1: Concentric Zone Theory.

(Sources: This diagram was found in Park, R. E.; Burgess, E. W, eds. (1925). *The City* (1st ed.). Chicago, IL: University of Chicago Press.)

The City: Suggestions for Investigation of Human Behavior in the Urban Environment, THE HERITAGE OF SOCIOLOGY, A Series Edited by Morris Janowitz, 1967, The University of Chicago Press, Chicago and London

14.4.2 Modification and Relevance of the Theory

Relevance of The Theory- This theory was the first comprehensive attempt at explaining city structure. Though E W Burgess's simplistic concentric zone theory received huge criticisms, the theory had some relevance as well. Burgess claimed that no systematic study has been made so far on urban expansion as a process. Mere demographic data like sex ratio, density and population growth cannot capture the expansion process fully. In Europe and America, cities expand beyond the political limit and create a '**Metropolitan Area**' (p 49, Chapter II, *The City*).

He also modified his theory by accepting that urban regeneration and the growth of satellite towns may change the simplistic concentric zone pattern.

Satellite loops or the CBD of the Satellite towns also attract economic activities. But these satellite loops and sub-business areas are dominated by the main city loop (Chicago Loop in his theory). He also envisioned that immigration can create immigrant colonies in the satellite towns or suburbs.

Burgess also identified within his defined zones. Those pockets are inhabited by particular communities- Black Belt (African-American colonies), Little Sicily (based on ethnicity) and immigrant areas of Lawndale, the western suburb of Chicago had a Jewish **ghetto**. He also identified a low rent district within Chicago where artistic Bohemians live, it is a mixed locality, known as **Hobohemia (Hobo means mixed)**, the term was originally taken from Nels Anderson's book (Nels Anderson, 1923, The Hobo). The zone of deterioration encircling the CBD is called slums.

He also modified the concentric zones along with the transportation system. In 1860, the main transport line was horse car lines and in 1890, horsecar lines were replaced by trolley car lines. In 1925, electric suburban lines revolutionized America's transport system. It reduced per capita transport costs and time to travel. Transport lines increased the land value of the Loop more than suburban areas. The highest land value is found in Madison Streets. Introduction of rapid transport lines doubled or quadrupled satellite loops. This process is known as **the organization and disorganization** process.

SAQ 2

Define the following

- a) Bid Rent Curve
 - b) *Hobohemia*
-

14.5 SECTOR MODEL

Homer Hoyt, a well-known economist propounded the Sector Model theory in 1939. He tried to overcome E W Burgess's Concentric Zone theory. His model is based on a) residential rent pattern, and b) transport system. His empirical study was based on 34 American cities. He prepared city maps and showed that high-class residential areas are found in more than one sector. He also studied Latin American cities. He identified that in Guatemala, Puerto Rico and Buenos Aires cities single-family dwellings are found in one side of the city; but in New York, they are found in scattered clusters in the metropolitan areas. The CBD is found at the city core, it is a concentric zone, but residential areas developed in a sector form along the transport line.

Salient Features of Sector Model

The main features of this sector model are-

1. A city develops as a series of sectors, not in concentric rings
2. Different areas attract different types of activities

3. As the city grows, the activities within CBD grow outward in a wedge shape
4. Hoyt modified concentric zones along transport lines
5. Most of the major cities evolve around transport lines (railroad, trolley lines) and thus, radiate outwards along the transport line.
6. In this theory, transport lines were given special emphasis, but no emphasis was given on out of town development, or physical relief features. It did not consider possession of private cars.

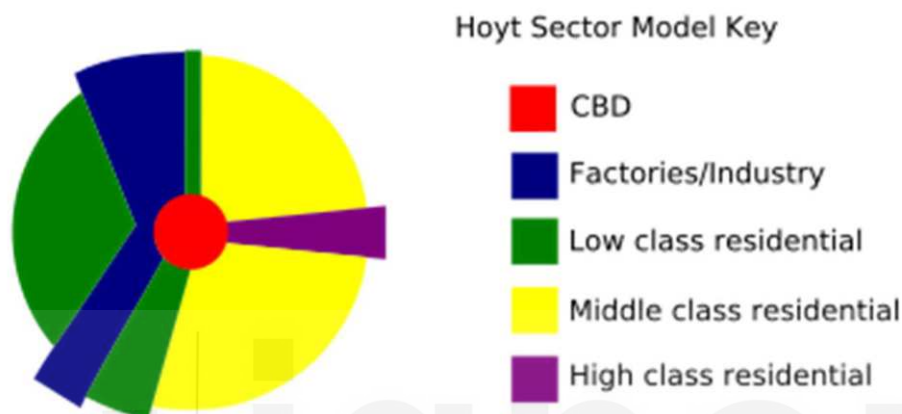


Fig. 14.2: Sector Model Diagram

Short Coming

Berry and Horton (1970) criticised this theory as well. Here only housing characterises, land rent and transport lines got attention, but other factors like urban politics, culture etc. are overlooked.

SAQ 3

- a) Name the two basis on which sector model was developed.
- b) State the shortcomings of sector model.

14.6 MULTIPLE NUCLEI MODEL

The earlier theories largely overlooked the growth of multiple urban centres and CBD; but in 1945, Chauncy D. Harris and Edward Ullman propounded that a city has multiple growth centres or nuclei (*The Nature of the City* article was published in *The Annals of the American Academy of Political and Social Science*, in the year 1945). They argued that cities are paradoxes and each city is unique.

The internal structure of a city depends on the peculiarity of its sites. In a flood-prone plain, well-drained elevated areas will attract high-class residences. Poor quality flat land attracts heavy industry, due to cheap land value and easy transportation. Nodal points or where the transport lines converge offers the highest land value, and it is called the CBD, where all business activities are centred. Adjacent to the CBD, wholesale trade and light manufacturing units develop, along with low-class residential areas.

In this theory, CBD is not the only urban centre, it is the financial district where business and commercial activities are located. The city may have smaller CBDs or multiple nuclei. Automobiles led to the dispersion of cities.

Other nodes or nuclei may develop around an airport, port, university, park and neighbourhood business centres. For example, Airport attracts hotels, apartments and shopping malls. Earlier these nuclei were separate settlements, but due to the expansion of the city, these centres joined together. However, old specialization continued.

There is no clear CBD in this theory. Distance decay theory and profit maximization theory are still applicable to this theory. According to Distance decay theory, land value and population density decline with distance from the central place. Profit maximization theory says that a particular activity will locate itself where maximum profit can be achieved. This theory also assumes that transport cost is uniform.

Salient Features of the Theory

1. **Central Business District or CBD** is the financial district of a city. The older or main CBD has traditional financial activities like banks, real estate and insurance companies. Smaller CBDs have specialised services. They reduce the pull of older CBD.
2. **Wholesale and light manufacturing units** have clothes, furniture, electronic goods manufacturing units.
3. **Residential Districts** or pockets are divided based on housing characterises and land value.
 - a) **Low-Class residential zones** are found near the industrial corridors. Poor people cannot afford to commute longer distances.
 - b) **The middle-class residential area** is located away from the congested industrial corridors. Dwellers have better affordability to access a rapid transport system.
 - c) **High-class residential areas** are found at the edge of the city within green and clean landscapes. Michigan Avenue is a High-class residential area within Chicago.
 - d) **Residential suburbs** are located on the outskirts of the city. Here single-family dwellings on a small plot of land are found.
4. **Outlying Business Districts** are located near the middle class and high-class residential zones. These districts offer specialised services like airports, malls, colleges, universities etc. which need space.
5. **Heavy manufacturing industry district**- This district is located near the transport nodes, due to easy accessibility.
6. **Industrial suburbs** are located at the outskirts of the city, near the rail station or water corridor.

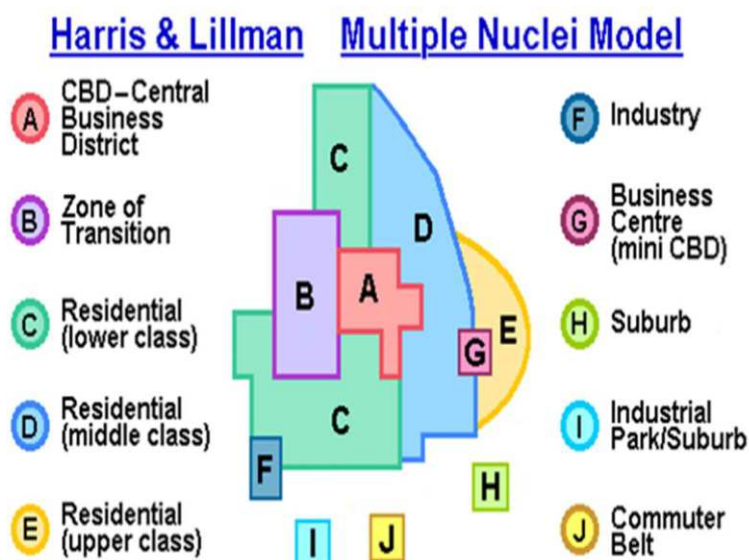


Fig. 14.3: Multiple Nuclei Model.

(Source: Harris, C. D., & Ullman, E. L. (1945). *The Nature of Cities*. *The Annals of the American Academy of Political and Social Science*, 242, 7–17.
<http://www.jstor.org/stable/1026055>

Main Shortcomings of the Theory

1. This theory did not consider the height of the buildings.
2. There is no abrupt division between zones
3. Each zone displays heterogeneity.
4. Zones are overlapping
5. Government policy and physical relief were not considered.
6. Unaware of inertia force within the city
7. This theory does not apply to oriental cities

14.7 COMPARISON BETWEEN ODELS RELATED TO URBAN MORPHOLOGY

Till now you might have understood all the three models related to urban morphology along with their merits and shortcomings. In the below given table a comparative analysis of all the three models are presented. This would help you in developing a critical perspective about these models.

Table 14.1: Comparison of the Three Models of Urban Morphology

Name of the theory	Concentric zone	Sector Model	Multiple Nuclei
Propounded by	Ernest W Burgess, (1925-1929)	Homer Hoyt (1939)	Chuancy Harris, Edward Ulman (1945)
City Structure	The city has five concentric zones Central Business District as its core	Cities expand along with transport routes (mainly rail routes).	Cities may begin with one CBD, but later multiple CBDs develop

	Zone of Transition Inner suburb or lower class residential zone Outer Suburb or high-class residential zone Commuter zone or high-class residential zone or outskirts	Sectors developed along transport lines. He proposed 6 zones- CBD, Zone of transition, lower-class residential, middle-class residential and upper-class residential zones and industries. Large industrial estates developed near rail routes away from the main city	It has 9 sectors- CBD Wholesale & light manufacturing Outlying business district Low class residential Middle class residential High class residential Residential suburb Heavy manufacturing Industrial suburb
Applied city	Chicago	Chicago	Chicago
Criticism	This theory is applied only to the US cities where the inner city is the poor and the outer city is richer. However, cities outside the US do not have it. Clear-cut zones are not found in the city; gentrification, urban development creates new urban centres. Low and high-class housing estates exist side by side.	Physical features, urban development are not considered here. The only rail route is considered.	This theory believes that cities develop on a homogenous flat surface. Physical barriers like hills, rivers are not taken into consideration. Cultural factors are not taken into account. Even distribution of resources, transport costs, and residential areas are not possible.

SAQ 4

- Name the two theories which were taken into consideration while developing Multiple Nuclei Model.
- Three Models of Urban Morphology was applied on which city.

14.8 DYNAMICS OF URBAN MORPHOLOGY

Till now we have discussed three models of urban morphology along with their strengths and weaknesses. You might have also realized that urban morphology of a city is not static. Major land-use patterns found within a city are discussed as follows.

14.8.1 Central Business District (CBD)

CBD is located at the city core. This zone has the highest land value and concentration of banks, insurances, stock markets and commodity exchange. Residential land use is almost nil or very minimum. In the USA, this area is also called Down Town. E. W. Burgess called CBD a loop.

14.8.2 Retail, Wholesale and Commercial Area

Before the Second World War, wholesale and retail trade was closely linked to the downtown. But, from 1960-70s onwards warehouses, industries and wholesale trade centres started moving towards the outer periphery for reducing air pollution in the city.

14.8.3 Industrial Areas

In the 19th century, industrial areas were close to the CBD. This area was further divided into light manufacturing areas (furniture, clothes, and electronic goods) and heavy industries. Due to pollution and high land rent, in the late twentieth century, industrial areas moved outside the city limit away from the residential areas.

14.8.4 Residential Areas

This is the most important part of a city. Depending on housing rent, residential areas can be divided into low-class residential areas, middle-class residential areas and high-class residential areas and the residences of the rich. 19th-century scholars like Burgess, Harris, Ullman and Hoyt assumed that the working class could not afford to live away from the factories and CBD. So, they preferred to stay near the CBD, in congested localities with dilapidated buildings or rows of rooms. Working-class residential areas are characterized by old and dilapidated buildings, one-roomed dwellings, high density of population and congestion. Middle-class people prefer to live away from the CBD, but near the rapid transport lines (trolley cars, electric suburban rail).

This zone is characterized by two-storied buildings, where landlords live on the ground floor and the tenants live on the first floor. High-income group people live further away from the congested city. Single-family dwelling units are found here. Commuters' zone or outskirts of the city is preferred by extremely rich people, who can afford to have private cars. Here rural-urban land use is found, along with picturesque houses with gardens and open surroundings.

14.8.5 Urban Villages

Commuter zone is followed by rural-urban fringe area. This area is characterized by rural land use (agricultural farms, livestock farms) as well as urban land use. This is a transition zone. Due to the expansion of the city, villagers changed their occupations. Agricultural farms are replacing with industrial parks, high-class residences, amusement parks and so on. Urban villages have a) mixed land use zone, b) medium density housing, c) access to rapid public transit. According to Ramachandran (1989), urban villages have slum-like existence. Delhi has many urban villages (For example- Munirka Village in South Delhi).

14.8.6 Slums

The Encyclopaedia Britannica has defined slums as the residential areas that are physically and socially deteriorated and in which satisfactory family life is impossible. Poor housing is a major index of slum conditions. Poor housing means dwellings that have inadequate light, air, toilet and bathing facilities; that is badly in need of repair, damp and improperly heated; that do not afford opportunities for family privacy, that are subject to fire hazards and that overcrowd the land leaving no space for recreational use. The word 'slum' has been derived from the Irish word 'Slome', meaning a bleak or destitute place.

Slums are also known as 'Shanty town' in Ireland, 'Favela' in Brazil, 'Rancho' in Venezuela, 'Barriadas' in Peru, 'Villas Misarias' in Argentina, 'Barong Barong' in the Philippines, 'Kevettits' in Myanmar, 'Gecekondur' in Turkey, 'Ghetto' and 'Skid Rows' in North America, although each of them may have a somewhat different meaning. Skid row refers to an urban area with a high homeless population and the name is derived from the Skid Row of Los Angeles. 'Favela' refers to the settlements of African slaves in Brazil and the word 'Ghetto' originally denotes Jewish colonies in Venice and in the USA the word 'Ghetto' refers to African settlements. Similarly, 'Shanty Town' denotes Irish settlements in North America. Despite different meanings and racial connotations, all these words describe slum-like settlements where poor immigrants are forced to live without basic amenities and services. Apart from all these terminologies the word 'Squatter settlements' also refer to slums and it is popularly used as an alternative to 'slum'. In India 'slums' are often known as 'Bustees' or 'Jhuggi Jhopri' colonies.

Squatter- The Oxford English Dictionary describes a 'squatter' as a person who settles on new land, i.e. especially public land without title, a person who takes unauthorised possession of unoccupied premises. Therefore, a residential area occupied by squatters becomes a squatter settlement.

14.8.7 Census Definition of Slum in India

Registrar General of India has adopted the following definition. For Census of India 2001, the slum areas broadly constituted:

- i. All specified areas in a town or city are notified as 'slum' by state/ local government and UT Administration under any Act including the 'Slum Act'.

- ii. All areas are recognised as slums by the State/ Local government and UT Administration. Housing and slum boards which may have not been formally notified as slum under any act.
- iii. A compact area of at least 300 populations or about 60-70 households of poorly built congested tenements, in unhygienic environments usually with inadequate infrastructure and lacking in proper sanitary and drinking water facilities.

The Census of India 2011 categorized three types of slums a) Notified slums are recognized as a slum by the State or UT government by the Slum Act and are governed by a Slum Board., b) Recognized slums are recognized as slums by the State and local government, but no slum board is found, and c) Identified Slum, these slums are identified during census enumeration but not recognized officially. A compact area of at least 300 population or about 60-70 households of poorly built congested tenements, in the unhygienic environment usually with inadequate infrastructure and lacking in proper sanitary and drinking water facilities is identified as a slum by the Census of India.

SAQ 5

Match the following

Name

- a) Gecekondü
- b) Kevettits
- c) Favela
- d) Shanty town

Country

- i) Ireland
- ii) Turkey
- iii) Myanmar
- iv) Brazil

14.9 SUMMARY

The discourse of urban morphology remained dominated by architects for a long time. However, the propagators of the British School first developed land use maps of cities. Scholars of the Chicago School propounded three theories on urban morphology that tried to explain city structure universally. E W Burgess in 1925 tried systematically explain the process of urban expansion. His Concentric Zone Model explains urban morphology in a very simplistic way. Homogenous plain, uniform distribution of resources, profit maximization and bid rent curve are the basic assumptions that paved the way for Concentric Zone and its successive theories. E. W. Burgess faced tremendous criticism. Hoyt in 1939 propounded sector model theory to counter the Concentric Zone theory. Again in 1945, Harris and Ullman propounded multiple nuclei theory which explained cities with more than one growth centre. However, all these theories were based on economic parameters. The introduction of the new and fastest mode of transport changed urban morphology, and these three theories perfectly captured that. During the time of E W Burgess, trolley lines and horse car lines were the most popular transport; Hoyt witnessed the introduction of electric suburban trains that increased mobility of the commuters. Harris and Ullman witnessed the automobile revolution that provided autonomy to the rich people to live away from the congested city centres. Thus, complexities within city layout

increased and the older theories lost importance. However, these three theories cannot be discarded completely. They have provided certain concepts of zoning within urban settlements and these zones are almost universal. All cities have one old CBD or core; industrial areas for light and heavy manufacturing units; wholesale and retail trade zone; residential areas of high class, middle class and working-class people. Expansion of cities transforms rural surroundings and creates fringe areas. Within the city, poor people live in slums where room rents are low, but congestion is high. Similarly, certain communities, especially the immigrants prefer to live in a homogeneous cluster known as the ghettos. Urban morphology is a dynamic concept. City layout changes with time and innovation of fastest transportation as well as technologies. Urban politics and social factors also influence urban morphology, but these aspects were largely overlooked by Chicago scholars.

14.10 TERMINAL QUESTIONS

1. Discuss in brief contributions of various scholars on urban morphology.
2. Describe Concentric Zone Theory by Burgess and highlight its relevance.
3. Explain salient features of Sector Model Theory.
4. Discuss salient features of Multiple Nuclei Theory.
5. Critically evaluate dynamics of urban morphology.

14.11 ANSWERS

Self-Assessment Questions (SAQ)

1. a) ii; b) iii; c) i
2. a) It refers to the increasing land rent towards the periphery of the city.
b) It is a mixed locality where artistic Bohemians live.
3. a) Residential rent pattern, and transport system.
b) In this model, only housing characterises, land rent and transport lines got attention, but other factors like urban politics, culture etc. are overlooked.
4. a) Distance decay theory and profit maximization theory
b) Chicago
5. a) - ii; b) - iii; c) - iv; d) - i

Terminal Questions

1. Refer to section 14.3.
2. Refer to section 14.4.
3. Refer to section 14.5.
4. Refer to section 14.6
5. Refer to section 14.8

14.12 REFERENCES AND FURTHER READING

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SETTLEMENT HIERARCHY |

Structure

15.1	Introduction	15.4	Rank Size Rule
	Expected Learning Outcomes	15.5	Urban Hierarchy in Global City
15.2	Factors Contributing to Hierarchy of Settlement	15.6	Urban Hierarchy in India
15.3	Central Place Theory	15.7	Summary
	What is a Central Place?	15.8	Terminal Questions
	Measurement of Centrality and Hierarchy	15.9	Answers
	Walter Christaller's Theory	15.10	References and Suggested Reading
	August Losch's Theory		

15.1 INTRODUCTION

In the previous two units' i.e. Unit 13 and Unit 14 we have a detailed discussion on structure and morphology of rural and urban settlements. Till now you might have understood that human settlements do not exist in isolation. They are inter-connected and stay in a system. All settlements are not same; they vary according to size of the population. Some settlements have huge population and some have very few. Size of a settlement depends on physic-historic and socio-economic condition of the settlement and its relation with others settlements. Apart from population size, every settlement has some function or more than one functions; it generates services and goods. Based on their size and functions settlements can be grouped into a hierarchical order. Thus population size is the first factor which creates settlement hierarchy and size-class classification is accepted almost all over the world. Main profession of the people is considered as the main function of the city and if there are diversified population, the settlement has more than one function and generates more services as well as goods. Thus, function is another actor that creates hierarchy of settlements. A settlement becomes a central place, when it offers various services to its neighbouring settlements and it is the main theme of settlement hierarchy introduced by Christaller in 1933.

In this unit, we will learn about factors contributing to hierarchy of settlement in section 15.2. In the Section 15.3 we will discuss about Central Place Theory given by Christaller and later on modified by Losch. This is followed by

Rank Size Rule in the Section 15.4. Finally in the Sections 15.5 and 15.6, an attempt has been made to explain the hierarchy of global city in present day context and apply settlement hierarchy in Indian context.

Expected Learning Outcomes

After studying this unit, you should be able to:

- Define Central place, hierarchy of central places, and centrality;
- Differentiate Christaller and Losch model of central places;
- Describe the method of ranking the settlement;
- Explain the hierarchy of global city in present day context; and
- Apply settlement hierarchy in Indian context.

15.2 FACTORS CONTRIBUTING TO HIERARCHY OF SETTLEMENTS

Three main factors contributing in the hierarchy of settlements are:

- a) Size of the population,
- b) Functions performed, and
- c) Sphere of influence.

The last component, the 'sphere of influence' directly depends on the number of services a settlement offers, its accessibility and competition with other settlements. The maximum distance a customer travels to purchase a good and service determines its range and it is called the sphere of influence. Small settlements offer fewer services and their sphere of influence is also small. A hamlet has its sphere of influence only a few kilometres. However, a city offers many services and some are specialised ones. A city may have a sphere of influence beyond hundreds of kilometres. So, the sphere of influence is not only a settlement's geographical area, but its functional area. In the scale of hierarchy, isolated hamlets are standing at the lower end and cities are at the upper end. Many scholars propounded theories on settlement hierarchy, but German geographer Walter Christaller's Central Place theory is one of the crucial one.

15.3 CENTRAL PLACE THEORY

Walter Christaller's *Die Zentralen Orte in Suddeutschland* or Central Places of South Germany was the first written exposition of central place theory. It shows settlements hierarchy based on economic activities or in other words, it shows spatial arrangements of settlements based on size, number, and distribution of clusters of urban centers and institutions.

In his book, Christaller has said that the crystallization of mass around a nucleus is an organic as well as inorganic in nature and the most elementary form of ordering of things that belong together- or exists in a centralistic order. Centralistic principal is also applicable in settlements. If we look into a medieval town, we can see that the settlement followed a strict centralistic pattern. They had a prominent nucleus like forts etc. However, visible symbol of centralistic order of a city is absent in today's cities. Christaller said that

even modern cities also follow centralistic pattern, but now it is their functions or *chief profession* of a town. The *Chief Profession* of a town is very much important and it makes a settlement central place to its rural surroundings or hinterland. The rural hinterland or the areas outside the central place is composed of farms, hamlets and villages looking like pawns in a chessboard. They are called *Unabgesondert*. It is a German word, means unprotected parts of a medieval town that usually lies beyond the city wall.

All regions have some central places, they may be market spots or small towns or big cities. The centrality is a relative concept and it differs from region to region.

Two basic concepts influence Christaller Central Place theory, the first one is the concept of homogeneity and the second one is the development pole or economic node that has a service area or hinterland delineated by threshold. Based on these two broad concepts, Christaller propounded following assumptions-

1. There should be a homogenous plain, or a limitless plain, without any physical barriers (like mountains, rivers etc.) that might change transport routes.
2. A rural population that is evenly distributed across the homogenous plain.
3. Homogenous transportation services that enable a man to move in any direction with equal ease. Humans will purchase goods and services from the closest place.
4. Based on the first three assumptions, an economic landscape develops. Now, the evolution of this economic landscape depends on the development of tertiary activities.

When demand for a certain good is high it will be offered in the closed proximity of the population. When demand drops, supply or availability too drops.

In order to explain the spacing of urban settlements over the landscape, Christaller developed three two-dimensional models of the economic landscapes, based on marketing, transport and administrative principles

15.3.1 What is A Central Place

A central Place is a settlement that provides goods and services to its own population as well as population of other neighbouring settlements. Here the concept of threshold is very important. **Threshold means minimum number of people needed for a central place business or economic activity to remain active and flourishing.** So, he divided goods and services into lower and higher order goods. The concept of 'Lower and Higher Order Goods' incorporate food to other household necessities, even services. Lower order goods like foods, groceries make our daily needs, and people like to purchase them from the nearest centre. Higher order goods like automobiles, furniture etc. specialised items, and people buy less frequently and therefore, may travel longer distance. So, these specialised goods and services need a

larger **threshold of population** than the lower order goods like groceries. Therefore, higher order goods and services are located in big cities.

Based on this concept, there are three types of goods and professions-

1. **Central Professions which include Central goods and services-** the goods and services produced or offered at the central place. e.g. - Administrative services, Airport etc.
2. **Dispersed goods and services-** they are produced or offered at the dispersed places.
3. **Indifferent goods and services** that are found everywhere.

British geographers divided them into rural and urban goods, but Christaller did not use these terms. In case of goods and services there are two aspects which should be taken- a) production aspect and b) offerings or distribution aspect. A central good can be centrally produced but dispersedly offered. Following Alfred Weber's terminology they can be consumer oriented and raw material oriented. Christaller also gave suitable examples of consumer oriented and raw material oriented goods. Breweries are consumer oriented, but dairies and sugar refineries are raw-material oriented industries.

Central services are banking, trading etc.

Economic distance of Range of a good- every good and service has an economic distance, which depends on physical distance. Transport cost, insurance, storage, passenger's travel time, loss of weight during transport, discomfort in travel- all these factors determine economic range of a good or services. The economic distance is equal to the geographical distance converted into freight and other economically important transportation advantages or disadvantages. In simple words, economic range means the average maximum distance people are willing to travel for buying certain goods or services.

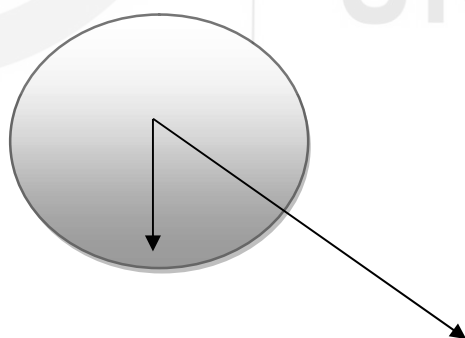


Fig. 15.1: Concept of Threshold & Economic Range.

SAQ I

- a) What are the two basic concepts that influenced Christaller's Central Place theory?
 - b) Describe in brief the concept of threshold.
-

15.3.2 Measurement of Centrality and Hierarchy

Centrality and Hierarchy are two major concepts related to measurement of central place. Walter Christaller and August Losch have made a significant contribution in the development of central place theory. Central Place theory was originally developed by Christaller in the year 1933 in his book titled "Central Places in Southern Germany". Later on this theory was modified by German Economist August Losch in 1940. Both the theories have described the spatial distribution of cities related to human settlements.

15.3.3 Walter Christaller's Theory

Christaller also visualized two types of central places, higher order and lower order central places. Lower order central places are the Complementary Region of the higher order central places; they are termed as Ergansungsgebiet (supplementary or complementary region). It is very difficult to identify complementary regions or lower order central places, they are often overlapped on each other and change periodically. They are also called Importance-Deficit region, against Importance-Surplus Regions or higher order Central places. Size of the settlement is the main important factor that determines ordering of central places.

Within the Central place System, there are five sizes of settlements -

1. Hamlet,
2. Village,
3. Town,
4. City and
5. Regional Capital.

Hamlet is the smallest rural community, too small to consider as a village. Regional Capitals are highest order settlements like Los Angeles or Paris; they may not be administrative capitals.

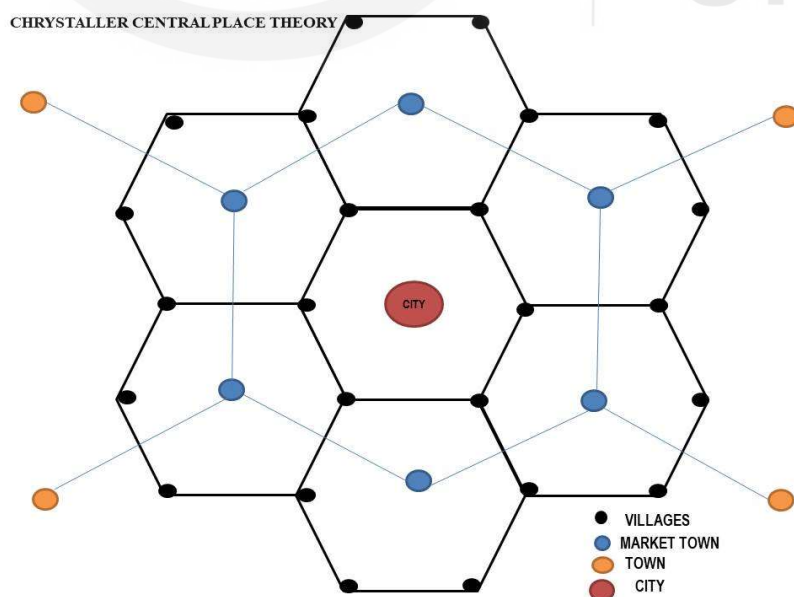


Fig. 15.2: Arrangements of Central Places.

Christaller noted three different principles for arrangements of central places-

1. Market principle (K=3 system)
2. Transport Principle (K=4 system)
3. Administrative Principle (K=7 system).

Christaller developed hexagonal model to explain these systems and each hexagon has one central place at the middle and six at the periphery, total 7 in a hexagon.

In the K=3 system, central places are all market centres, they serve their own population and one third population of the each neighbouring lower order central places. That is why it is called K=3 system.

In K=4 system central places are transport nodes, they serve their own population and $1/4^{\text{th}}$ of each consecutive lower order central places located in the region.

In K=7 system, central places are administrative headquarters, they serve their own population as well as entire population of all the six settlements existing in the hexagon.

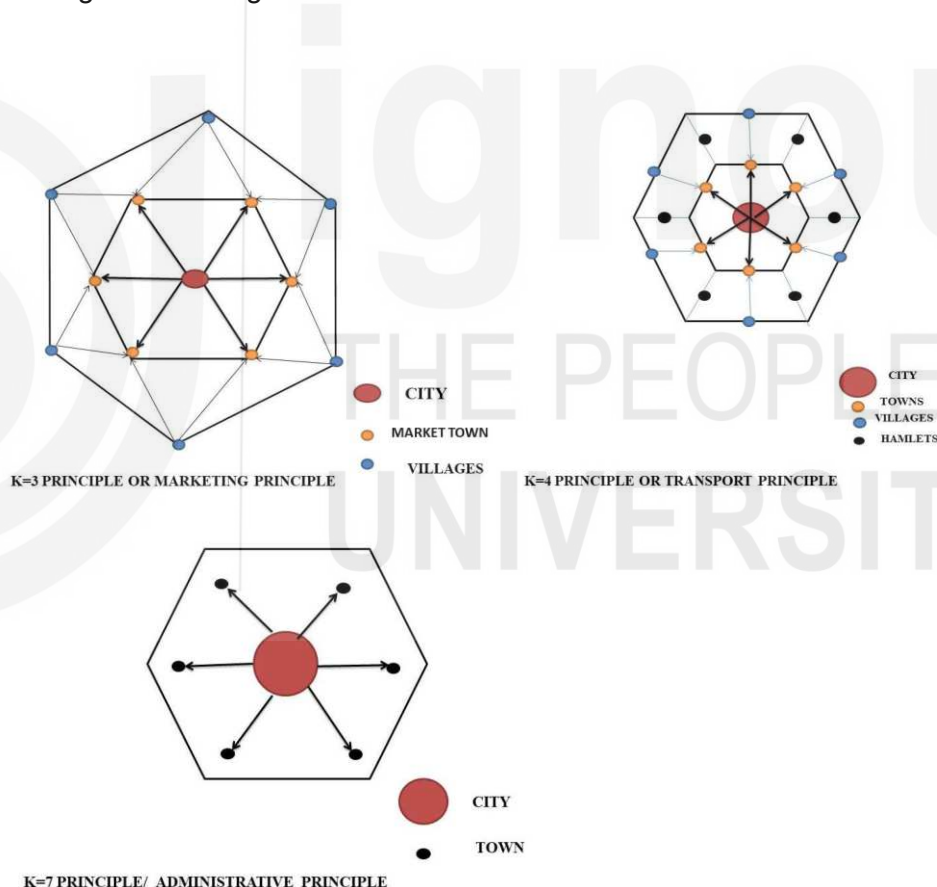


Fig. 15.3: Principles for Arrangements of Central Places.

Relevance of Central Place Theory – Christaller theory gives us an important concept, the concept of centrality.

Concept of Centrality- Centrality is the measure of importance of a place in terms of its functional capacity to serve the demands of population of its own as well as neighbouring settlements. There are high, low and moderate centrality on the basis of their functional base and importance of function. This

concept also establishes a precise relationship between the size of a settlement and services it offers and helps in explaining

1. Consumer services distribution
2. Market area analysis
3. Hierarchy of services and settlements

Central place theory is useful in planning, it explains locations of towns and cities and businesses. It was the first theory which explains spatial pattern of urbanization and explains why there is a hierarchy in urban centres. It also explains why certain business is located in a particular city.

Christaller used here hexagons and it has another advantage. He did not use circles, because they are equidistant from centre to the edge. Two circles either overlap or leave gaps. Squares net together, but their sides are not equidistant. So, he used hexagons, it has the property of both circles and squares. So, in Christaller theory market area is hexagonal.

Short Comings

However, it was criticized for being 'too static' and suitable for agricultural areas rather than modern areas. Christaller model is impossible in the real world, because-

1. Large areas or homogenous plains are rare, physical barriers like mountains; rivers, coast etc. modify transport routes. Transport cost cannot be same in all direction. In a mountainous area, building road is difficult, rivers offer cheap transport; aircrafts offer costly and efficient transportation in remote areas as well.
2. Perfect competition is unreal, some farms always earn more than the others
3. Government intervention can change location of a certain industry.
4. People and resources are not evenly distributed. Christaller overlooked natural endowments and individual's shopping trend. People not always prefer the nearest shop.
5. Christaller envisaged that each centre has a particular function, but in reality, one settlement may have more than one function and function of a settlement may change over time.

13.3.4 August Losch's Theory

In 1954, German economist August Losch modified Christaller theory. His thesis Economics of Location was first published in 1939. It has a focus on location of economic region. He also used the same hexagonal lattices and assumed that raw materials are equally distributed on a flat plain. However, differences came, when he found some settlements provide specialized functions and it changes the K value. According to Losch, no K value is sacrosanct. Every city has poor and rich sectors and they economically behave differently.

He developed a system in which six city rich and six city poor areas are assumed. City-rich sectors produce higher order services, but city-poor sectors have relatively poor services.

Table 15.1: Differences between Christaller and Losch's Central Place Theory

Christaller Central Place Theory	Losch's Central Place Theory
The number of settlements served by each central place is denoted as K. K values are fixed.	K values are not fixed or sacrosanct.
His hierarchy has definite steps or tiers. In each tier, all settlements have same size and same function.	Settlements of same size may not have same functions.
Higher order places contain all the functions of the lower order settlements.	Larger places may not have all the functions of a smaller settlement.

Apart from Christaller and Losch, many other economists also tried to measure centrality of a settlement. Smailes (1944) has used bus service frequency by calculating centrality of a settlement and he called it functional index. Dickinson used wholesale trade and Green (1948) used bus service frequency to measure centrality of a place. John Marshall's book *The structure of Urban Systems* (1987) reviews Christaller's CPT concept and applied in analysing real urban system. Even in India scholars used Central Place model of Christaller for identifying centrality of a settlement.

SAQ 2

- Name the five sizes of settlements within a central place system.
- Name the three different principles for arrangements of central places in Christaller's Central Place Theory.

15.4 RANK SIZE RULE

In order to construct urban size hierarchy urban centres must be ranked according to population size. G.K. Zipf (1948) postulated a simple model which states that population size of a given city tends to be equal to the population of the largest city divided by the rank of the given city. So, the given formula is-

$$P_n = P_1/n$$

P_1 = Population size of the largest city

P_n = Population size of the given city

n = Rank of the city's population- largest city = 1, second largest = 2

Therefore, according to the rank size rule,

Rank 1 city - Largest city

Rank 2 city- 1/2th of the Rank 1 city

Rank 3 city- $1/3^{\text{rd}}$ of the Rank 1 city

Rank 4 city - $1/4^{\text{th}}$ of the Rank 1 city

However, these are hypothetical populations. In some countries the difference between the first and second rank cities are less than expected and in some countries especially in the developing countries, it is more than expected.

Zipf said that “if all the settlements of a country are ranked according to population size, the sizes of the settlements will be inversely proportional to their rank.”

If the largest city is commonly at least twice as large as the next largest city and more than twice as significant is called Primate City. It is called the law of Primate City, first given by Mark Jefferson (1948).

Application of Rank Size Rule on Indian Cities:

India has 31.6% urban population in 2011. The country has 46 million plus cities or population above one million. Three cities have above 10 million populations, Mumbai, Delhi and Kolkata. The rank size rule exercise shows that Mumbai is the largest city, followed by Delhi, Kolkata Bengaluru, Hyderabad, Ahmadabad and Chennai. However, the actual population is much higher than the expected population.

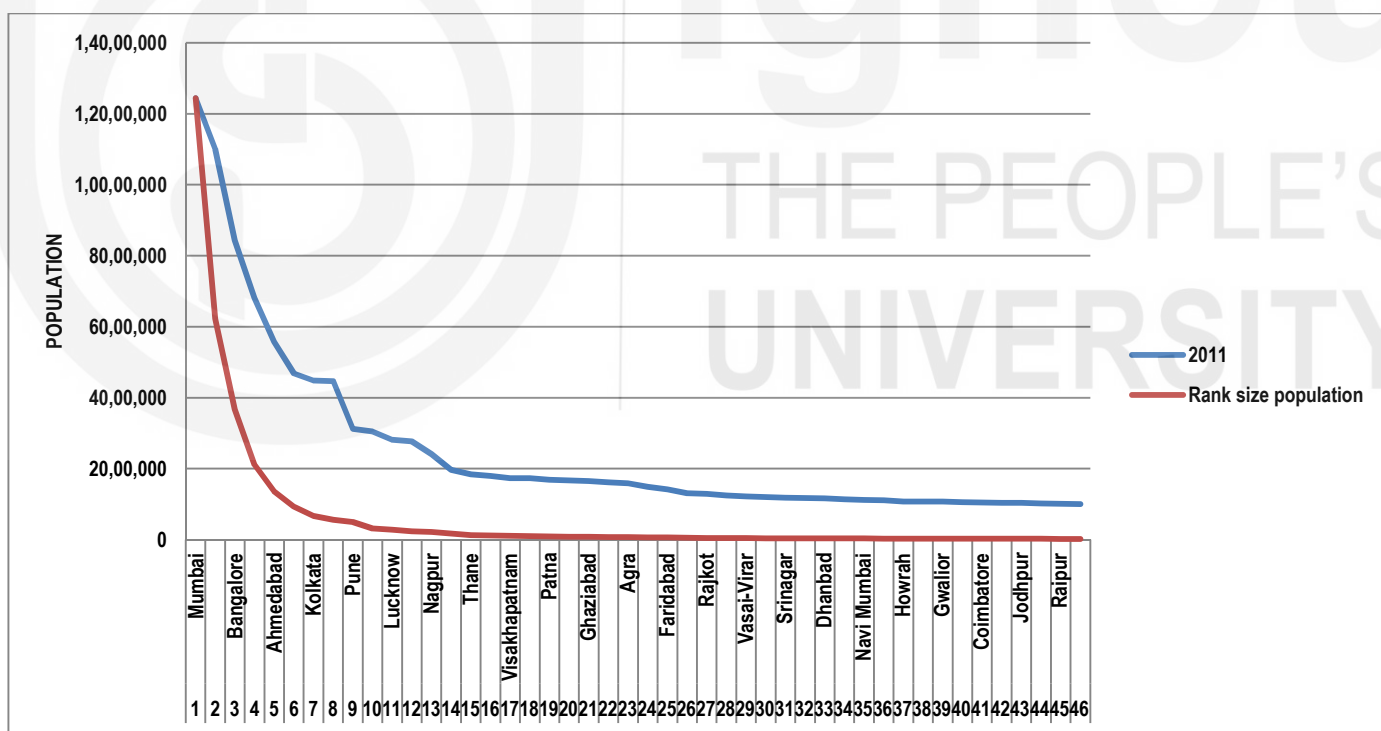


Fig. 15.4: Rank Size Population and Actual population of Million Plus Cities, India, 2011.

In this unit, we have also analysed the state of West Bengal's city population. There are 29 cities above one lakh of population. Kolkata is the largest city, followed by Asansol, Siliguri, Durgapur; but Asansol's population is less than half of Kolkata's population, and Siliguri too has less than one third of Kolkata's population. So, in West Bengal Kolkata is the primate city.

Therefore, city primacy and result of rank size rule differs from national level to regional level.

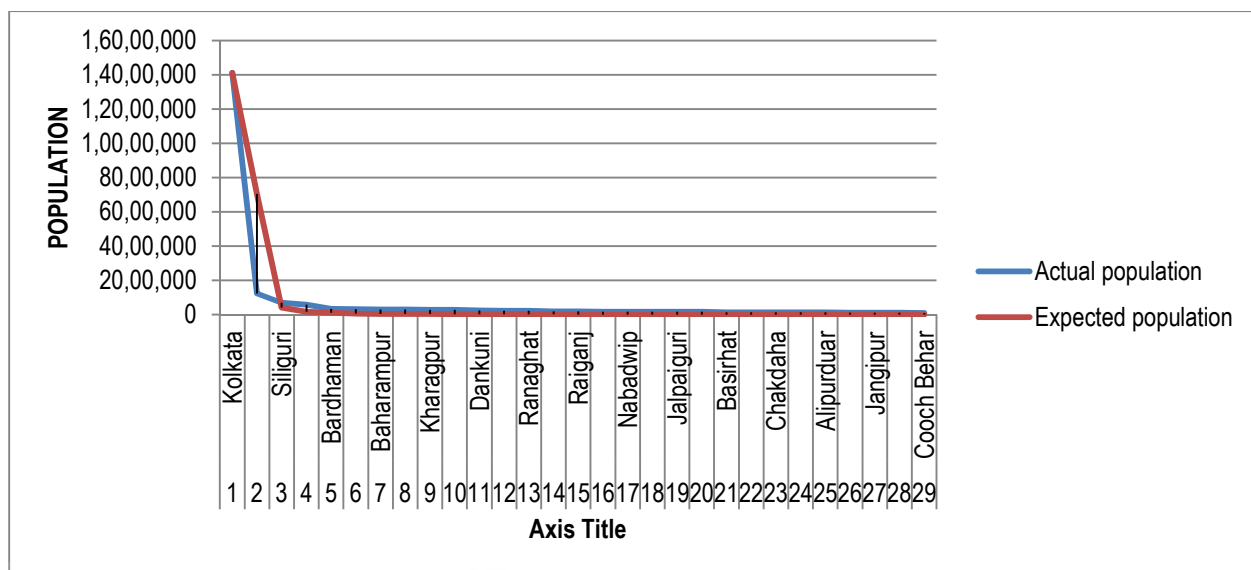


Fig. 15.5: Rank Size Population and Actual population of Million Plus Cities, West Bengal, 2011.

SAQ 3

Fill in the blanks with appropriate word

- In order to construct urban size hierarchy urban centres must be ranked according to _____.
- According to Zipf the sizes of the settlements will be _____ to their rank.
- In West Bengal _____ is the primate city.

15.5 URBAN HIERARCHY IN GLOBAL CITY

Richard. L. Florida, a Professor of urban Studies at the University of Toronto, published the second Global Economic Power Index (2015), a meta list of global cities. It evaluates the rank of the global cities based on the magnetism or comprehensive power of attracting population. It measures six functions-

1. Economy,
2. Research and Development,
3. Cultural Interaction,
4. Liveability,
5. Environment, and
6. Accessibility

Data collection is monitored and every year new ranks are calculated. It has been found that the top ten cities retained their rank over the years, while North American Cities are rising and Beijing and Shanghai fail to retain their ranks.

London is the first rank city, followed by New York and Tokyo; Paris 4 and Singapore 5.

Globalization and World Cities Research Network (GaWC study) in 2010 classified Global Cities into alpha++ (London and New York) and alpha+ (Beijing, Paris, Tokyo, Shanghai, Sydney, Singapore, and Hong Kong).

A.T. Kearney's Global City Index (GCI): In 2008, leading American journal Foreign Policy, in conjunction with the consulting firm A.T. Kearney and the Chicago Council on Global Affairs, jointly published a report on the ranking of global cities, based on consultation with Saskia Sassen, and others. Authors Mike Hales and Andres Mendoza Pena took five dimensions-

1. **Business activities**, which include headquarters of major global corporates, locations of business service firms, value of cities capital market, number of international conferences and the flow of goods through ports and airports. It was given 30 percent weightage.
2. **Human capital** or a city's capacity of attracting talent based foreign migrants or skilled immigrant labours, quality universities, international schools and number of residents with university degree. It was given 30 percent weightage.
3. **Information exchange** or how well circulated information is within and outside the city through telecommunication and IT. Indicators taken here are number of TV networks, broadband subscribers etc. It was given 15 percent weightage.
4. **Cultural experiences** are measured through number of international sporting events organized in the city, number of museums, art galleries, performing arts venues, diverse culinary establishments, number of international travellers and number of sister-city relationships. (Weightage had given 15 points).
5. **Political engagement** of a city is measured through how a city holds influence in global policy dialogue. Here indicators are number of embassies and consulates, major think tanks, international organizations, local institutions with international reach, and the number of political conferences hosted by a city. It was given 10 point weightage.
6. These above mentioned indicators are used for measuring a city's strength and vulnerability.

This report used projections as well as and found that-

1. London, Paris, New York and Tokyo will retain their positions in the coming decades,
2. Paris and Tokyo continue to swap positions 3 and 4,
3. Los Angeles, Chicago, and Hong Kong will follow the leaders at close
4. Seoul, Brussels and Washington will join the top ten cities.
5. Moscow and Vienna made the biggest improvements and Cairo and Bangkok dropped the furthest.
6. Melbourne will join to the GCI in 2012.

7. At least three Asian cities (Hong Kong, Singapore and Tokyo) always remain in the top ten lists. Germany will be an exception, no German city is at top ten lists, but in the lower ranks more than one German city are found.
8. These global cities are power centres and geopolitically important than their parent states, they are called geopolitical urban vectors.

However, rank of the cities differs from index to index, depending on objectives of the study and indicator chosen. A.T. Kearney took Business Activity, but Price water house Coopers (PWC) measured Economic Clout and it took indicators like number of global headquarters, financial and business services employment, FDI attraction, productivity and rate of real GDP growth. PwC'S Cities of opportunities 6 (2014) shows Chicago scores higher rank than San Francisco and New York in terms of standard of living.

Metropolis- It has etymological root in the Greek words metropoles (mother city). It has a connection with colonial cities. Earlier, settlers and explorers established cities elsewhere in the world and sent raw materials from those cities to the mother city or original city. They are called metropolis. However, metropolitan areas consist of a densely populated urban core surrounded by a low density area sharing infrastructure, industry and housing. A metro area comprises multiple jurisdiction, and municipalities. They also include satellite cities. In India, a metropolitan city should have 2 million or more population. Therefore, India has ten metropolitan cities. Example-Delhi NCR, Mumbai Metropolitan Region, Kolkata Metropolitan Area, Chennai Metropolitan Area, Bangalore Metropolitan Region, Hyderabad Metropolitan Region, Pune Metropolitan Region, Kanpur metropolitan area, Visakhapatnam Metropolitan Region and Nagpur Metropolitan Region.

A cluster of well-network cities is called **Megalopolis**. It was first used in 20th century and the first example of megalopolis is the *Bos-Wash Megalopolis* (Boston to Washington). The *Unified Jakarta-Bandung* metro area in Indonesia and the Pearl River Delta in China, are other examples.

The term **Mega city** was first documented in the University of Texas, in 1904. Initially United Nations used the term to describe cities with 8 million or more population, but now the threshold is 10 million. In the USA, a megacity's density should be 2000 per square kilometres. New York was the first megacity of modern time and it exceeds 10 million populations in 1936. In India, the definition of megacity is not very much different. In India, Mumbai, Delhi and Kolkata are megacities.

SAQ 4

- a) Name the six functions that were taken in to consideration while evaluating the rank of global cities.
 - b) What is mega city?
-

15.6 URBAN HIERARCHY IN INDIA

According to the Census of India, a settlement is called urban when it has a certain population limit and functions; a) A minimum of 5000 population, b) At least 75 per cent of the male main working population engaged in non-agricultural pursuits; and c) A density of population of at least 400 persons per sq. km.

If a settlement fulfils all these criteria, it is called a Census Town. India has 3894 Census Towns in 2011.

However, even if, a settlement cannot fulfil all these criteria, but has a municipality, corporation, and cantonment board or notified town area committee, as its administrative body, it is called a statutory town. India has 4041 Statutory Towns in 2011.

India has 7935 urban centres in 2011; earlier it was 5161, in 2001. Class I cities are 465, among them 53 cities have more than 10, 00,000 population. Among the million plus cities, there are three large UAs, which have more than 10 million population, Greater Mumbai (18.4 million), Delhi UA (16.3 million) and Kolkata (14.1 million). In India, more than 705 of the total urban population live in Class I cities or UAs.

Table 15.2: Percentage of population share by Size Class of UA/City/ Town

S. No	Size Class of UA/City/ Town	Percentage of population share (2011 Census)
1	Class I towns with more than 1, 00,000 population	74.98
2	Class II towns with 50,000 to 99,999 populations	14.81
3	Class III towns with 20,000 to 49,999 populations,	6.78
4	Class IV towns with 10,000 to 19,999 populations	2.38
5	Class V towns with 5000 to 9,999 population	0.98
6	Class VI towns with less than 5,000 populations	0.075

(Source: Census of India 2011, Provisional Population Totals Urban Agglomerations and Cities)

Apart from Cities, Census Towns and Statutory Towns, there are two more concepts, Urban Agglomeration and Out Growths.

*An **Urban Agglomeration** is a continuous urban spread constituting a town and its adjoining outgrowths (OGs), or two or more physically contiguous towns together with or without outgrowths of such towns. An Urban Agglomeration must consist of at least a statutory town and its total population (i.e. all the constituents put together) should not be less than 20,000 as per the 2001 Census. In varying local conditions, there were similar other combinations which have been treated as urban agglomerations satisfying the basic condition of contiguity. Examples: Greater Mumbai UA, Delhi UA, etc.*

Density varies within an Urban Agglomeration. Low density areas within a UA are labelled as indentations, jumps, undevelopable territory etc. Indentations are low density blocks protruded in the main body of the UA. Undevelopable

territories are like corridors that connects two densely populated areas. Jumps connect peripheral areas of the UA.

When a low density area is located in the UA and surrounded by high density areas, it forms an enclave. Exclaves are low density areas located at the outer margin of the UA. These classifications are mainly given by the US Census Bureau.

Out Growths (OG): *An Out Growth (OG) is a viable unit such as a village or a hamlet or an enumeration block made up of such village or hamlet and clearly identifiable in terms of its boundaries and location. Some of the examples are railway colony, university campus, port area, military camps, etc., which have come up near a statutory town outside its statutory limits but within the revenue limits of a village or villages contiguous to the town. While determining the outgrowth of a town, it has been ensured that it possesses the urban features in terms of infrastructure and amenities such as pucca roads, electricity, taps, drainage system for disposal of waste water etc. educational institutions, post offices, medical facilities, banks etc. and physically contiguous with the core town of the UA. Examples: Central Railway Colony (OG), Triveni Nagar (N.E.C.S.W.) (OG), etc. Each such town together with its outgrowth(s) is treated as an integrated urban area and is designated as an 'urban agglomeration'.*

Table 15.3: No. of Urban Agglomeration, Census and Statutory Towns in 2001 and 2011 Census

	2011 Census	2001 Census
Statutory Towns	4041	3799
Census Towns	3894	1362
Urban Agglomerations	475	384
Outgrowths	981	962

(Source: Census of India 2011, Provisional Population Totals Urban Agglomerations and Cities)

SAQ 5

Define the following:

- Urban Agglomeration
- Out Growths

15.7 SUMMARY

Human settlements are not isolated entity; they are interconnected with each other. Population size and occupations of people generate various services and goods; this is called function of the settlements. The maximum distance a customer travels to purchase a good and service determines its range and it is called the sphere of influence. Small settlements offer fewer services and their sphere of influence is also small. A hamlet has its sphere of influence only a few kilometres. However, a city offers many services and some are specialised ones. A city may have a sphere of influence beyond hundreds of kilometres. Thus the sphere of influence determines a settlement's functional area. This network creates a functional hierarchy, where hamlets stand at the

lower end with lowest sphere of influence, to the city with highest sphere of influence. Three main factors contributing in the hierarchy of settlements are- a) size of the population, b) functions performed, and c) sphere of influence.

Walter Christaller (1933) firstly wrote about the exposition of central place theory. Every town is a central place, and chief profession of the city dwellers determine its function. These goods and services are of three types- central professions or higher order services like airport, administrative services, dispersed goods and services found at dispersed areas, and indifferent goods and services found everywhere. Based on these functions he identified three types of central places – K7 system with central place with administrative services, K4 system with dispersed services like transport nodes, and K3 system with market place system. However, Christaller did not consider central places with multiple functions. Thus Losch modified this theory, where k value is not fixed and smaller settlements may offer unique services that bigger settlements do not have. However, neither Losch nor Christaller paid any heed to human resources, capital cultural factors and information of a settlement. Thus, both the theories have been outdated in recent years. Global city hypothesis has explained factors like outsourcing, immigration and policy engagements.

15.8 TERMINAL QUESTIONS

1. What is Central Place Theory of Christaller? What are the differences between Losch and Christaller's concept?
2. Explain Rank size rule with suitable example?
3. Discuss in detail urban hierarchy in global city?
4. What is urban agglomeration and outgrowth?

15.9 ANSWERS

Self-Assessment Questions (SAQ)

1. a) Two basic concepts were homogeneity and development pole or economic node
b) Threshold means minimum number of people needed for a central place business or economic activity to remain active and flourishing.
2. a) There are five sizes of settlements:
i) Hamlet, ii) Village, iii) Town, iv) City, and v) Regional Capital
b) Christaller's three different principles for arrangements of central places theory are: i) Market principle (K=3 system); ii) Transport Principle (K=4 system); and iii) Administrative Principle (K=7 system).
3. a) population size; b) inversely proportional; c) Kolkata
4. a) Economy, research and development, cultural interaction, liveability, environment, and accessibility.
b) Initially United Nations used the term to describe cities with 8 million or more population, but now the threshold is 10 million.

5. a) It is a continuous urban spread constituting a town and its adjoining outgrowths, or two or more physically contiguous towns together with or without outgrowths of such towns. It must consist of at least a statutory town and its total population should not be less than 20,000.
- b) An Out Growth (OG) is a viable unit such as a village or a hamlet or an enumeration block made up of such village or hamlet and clearly identifiable in terms of its boundaries and location.

Terminal Questions

1. Refer to section 15.3 and section 15.4.
2. Refer to section 15.5.
3. Refer to section 15.6.
4. Refer to section 15.7

15.10 REFERENCES AND FURTHER READING

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UNIT 16

SETTLEMENT POLICIES AND PROGRAMMES

Structure

16.1	Introduction	16.4	Smart Cities
	Expected Learning Outcomes	16.5	Sustainable Cities
16.2	Rural Housing & Infrastructure		Concept
	Housing		Elements
	Water Supply		Examples
	Road		Indian Context
	Sanitation	16.6	Summary
	Electrification	16.7	Terminal Questions
16.3	Urban Housing & Infrastructure	16.8	Answers
		16.9	References and Further Reading

16.1 INTRODUCTION

Economic and political ideologies and priorities, as well as demographic trends & patterns have influenced public policies in India, and infrastructure development is no exception. Simply put, infrastructure means “the basic systems and services that are necessary for a country or an organization to run smoothly” (Oxford Dictionary). Infrastructural development in India is restricted mainly as – ‘physical infrastructure’ like roads, houses, power lines, water supply, sanitation etc. In India, both union government and state governments follow some principles and guidelines to achieve development, which you may call as public ‘policies’, and these get implemented through a few ‘schemes’ that have specific objectives, financial allocation and components.

It is important, therefore, to ask what public policies are being outlined in India. What challenges do policymakers face? What kind of components get incorporated to implement such policies? How these schemes are monitored? We will try to develop our understanding about these policies and schemes, and find answers to the aforesaid questions.

In this unit, we will learn about policies and programmes related to different aspects of human settlements in India planned and implemented over time. In the section 16.2 and 16.3 policies and schemes related to infrastructure, housing, water supply, road, and sanitation. In section 16.4 and 16.5 we will discuss about SMART and sustainable cities.

Expected Learning Outcomes

After studying this unit, you should be able to:

- Differentiate policies and programmes/schemes in 'rural' and 'urban' areas;
- Describe the objectives or focus areas of various infrastructure development schemes; and
- Explain the significance of SMART cities and Sustainable cities.

16.2 RURAL HOUSING & INFRASTRUCTURE

Major emphasis in settlement policies is given to housing and infrastructure. Infrastructure is a broad term which includes road, sanitation, water supply, electrification. As these elements are related to basic needs of human being, each government has formulated policies and programmes related to these aspects. In this section we will briefly discuss policies and programmes related to the above mentioned dimensions related to human settlements.

16.2.1 Housing

Progress of villages through community development got necessary momentum in 1952. Under the ambit of *Community Development Programme*, a formal village housing scheme was launched in 1957. After many years, housing was given due importance under *National Rural Employment Guarantee Programme (NREGP)* which was initiated in 1980. It became a part of *Rural Landless Employment Guarantee Programme (RLEGP)* in 1983.

Indira Awas Yojana (IAY): It was launched as a sub-scheme of RLEGP in 1985-86. Later, from 1989, it became a sub-scheme of *Jawahar Rozgar Yojana (JRY)*. Finally in 1996, IAY emerged as an independent scheme. This scheme basically targeted poor SC, ST and minority households, which are included in BPL list. Landless poor households were given funds for arranging house sites. IAY funds could also be utilized for upgradation of kachha house. The funding patterns of this scheme is shared between central and state government in 75:25 ratio (90:10 in case of North Eastern states). Up to 5 percent of the funds can be utilized for vulnerable people like bonded labourers, manual scavengers, persons affected by occupational hazards and natural calamities etc. In this scheme, due importance was given to issues like social audit, flexibility in identification of difficult areas and appropriate building technologies. An attempt was also made to bring IAY beneficiaries under the ambit of other government schemes so as to concretize convergence and ensure that houses did not remain as isolated dwelling units, rather a part of affordable and environmentally good habitat.

Pradhan Mantri Awas Yojana (Rural): Since 2016, IAY has been revamped into PMAY for providing pucca houses to each and every houseless and those households living in dilapidated dwelling units. Now, the funding pattern has changed i.e. between central and state government (60:40) with an exception of North Eastern states. Using the database collected from Socio Economic and Caste Census and with active participation of Gram Sabha, beneficiaries have been selected every year to achieve the target of 'housing for all' by 2022.

16.2.2 Water Supply

Provision of drinking water in rural areas is one of the major areas of infrastructure development that are borne by government. *Accelerated Rural Water Supply Programme (ARWSP)*, initiated in 1972-73, was the major scheme that aimed supplying safe drinking water to rural areas. It targeted 'problem villages' (flood or drought affected, saline/alkaline soil affected), and remote areas. In 1986, to hasten the coverage of water supply, a *Technology Mission* was started. In 1991-92, this scheme got a new name i.e. *Rajiv Gandhi National Drinking Water Mission (RGNDWM)*. It had three components – coverage, sustainability and water quality. In 1999, *Sector Reform Project (SRP)* was introduced. It ushered in a major paradigm shift from 'Government-oriented supply-driven approach' to the 'People-oriented demand-responsive approach' in water supply sector through community participation at Gram Panchayat level. In 2009, National Rural Drinking Water Programme (NRDWP) was launched by modifying / subsuming earlier schemes. Again, it is restructured and subsumed into presently functional scheme named as *Jal Jeevan Mission (JJM)*. It aims to provide functional tap water connection to each and every household by 2024.

16.2.3 Road

Pradhan Mantri Gram Sadak Yojana was initiated in 2000 to connect villages with a population size of 500 persons (250 for hilly areas) with all-weather roads. In the beginning, it was fully funded by central government. On the basis of 14th Finance Commission's recommendations, now the funding of this scheme is shared between central and state government at 60:40 ratio.

16.2.4 Sanitation

Total Sanitation Campaign (TSC): Central Rural Sanitation Programme was launched in 1986, to improve sanitation conditions in rural areas. Later, Total Sanitation Campaign was promoted as a demand-driven community participation based programme, which attempted to improve rural sanitation scenario through checking open defecation, building latrines in schools/anganwadis, converting dry latrines into cost effective safe and hygienic latrines. As Information, Education and Communication remained one of the major components, various stakeholders like Panchayati Raj Institutions (PRIs), local NGOs, women groups, self-help groups, and cooperative societies were involved in the whole process. Cash incentives were given to BPL households who constructed toilets in 60:28:12 ratio (central government: state government: beneficiary), and in case of toilets constructed in schools/anganwadis, the total cost between central and state

government was shared in the ratio of 70:30. Supporting sanitary marts and management of solid and liquid waste were also included in the list of admissible components of TSC. This scheme was renamed as *Nirmal Bharat Abhiyan (NBA)* in 1999, and then still continuing as *Swachh Bharat Abhiyaan* (Clean India Mission) in 2014. One of the most highlighted part of NBA is the monetary support and other incentives (*Nirmal Gram Purashkar* or Clean Village Award) given to villages which get a tag of “open-defecation free” status.

16.2.5 Electrification

Rajeev Gandhi Grameen Vidyutikaran Yojana: Demand for electrification has been increasing due to changing nature of economic activities, consumption patterns and lifestyles in villages. Therefore, this scheme was launched in 2014, by which government targeted to cover unelectrified villages and to provide free electricity connections to households included in BPL list. Now, this scheme is renamed as *Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY)*. Apart from earlier two objectives, this revamped scheme also aims to supply adequate power to farmers, to ensure quality and reliability of power supply and to reduce losses. Since 2017, *Pradhan Mantri Sahaj Bijli Har Ghar Yojana – Saubhgya* is being operational to provide last mile electrical connectivity to households. In this scheme, power supply through solar power packs is encouraged so that households living in remote and inaccessible areas get benefitted.

Box 16.1: Providing Urban Amenities to Rural Areas (PURA)

PURA was conceptualized and coined by respected former President of India, Dr A P J Abdul Kalam in 2003. It targeted holistic development of rural areas so that their gaps with urban areas can be minimized. Ministry of Rural Development pursued this scheme from 2004-05 to 2006-07. Later, in 2012 PURA 2.0 was started to develop potential growth centres i.e. census towns. Public Private Partnership (PPP) was encouraged. Apart from the development of infrastructure like water, sanitation, streets, electrification, and so on, livelihood also got priority.

In 2014-15, it got modified and a revamped scheme i.e. *Rurban Mission* started. With an allocation of Rs. 100 crore, it aimed to develop 300 rural growth clusters.

Box 16.2: Bharat Nirman Yojana

It was realized by government that multidimensional development of infrastructure could lead to progress of villages. Therefore, Ministry of Rural Development started implementing *Bharat Nirman Yojana*. It focused on six components – irrigation, road, housing, electrification, water supply, and telecommunication. This scheme was operational up to 2013- 14.

SAQ I

- What type of households are prioritized for government sponsored housing schemes?
- Is there any importance of holistic development of village infrastructure?

16.3 URBAN HOUSING & INFRASTRUCTURE

Urban housing & infrastructure policies and schemes are interlinked with each other, and therefore, following time periods have been chosen to discuss urban and rural infrastructure and housing policies separately

1947 – 1964

Provisioning of housing was viewed as something which didn't have direct economic returns. Some of the contemporary policymakers of India didn't view housing as a constitutional right also. After independence in 1947, refugee rehabilitation was a key challenge. As rural-urban migration scaled up, mainly due to 'push' factors like poverty, uncertain crop production, unemployment etc, the demand for housing in urban areas was also large. Industrialists were trying to settle their workers in dwelling units with a single room and kitchen with shared amenities. *Industrial Housing Scheme* was launched in 1949. This scheme "envisaged the issue of interest free loans by the Central Government to the State Governments or private employers sponsored by the latter to the extent of two-thirds of the cost of an approved housing scheme, on condition that the rent charged would not exceed 21 percent of the capital cost subject to a maximum of 10 percent of the workers' wages, the employer contributing 3% of the cost of the houses" (NITI Aayog). Government also built dwelling units for its employees who belonged to Low Income Group (LIG). In brief, government focused on direct delivery of housing units. But, a large chunk of poor people, who were mainly in-migrants, had no other alternatives but to live in unauthorized squatters. These squatters mostly had no provisions of civic amenities like water and sanitation.

Moreover, due to the partition of the country, after independence, the large number of refugees from Pakistan came to cities and were looking to settle down to participate in non-primary economic activities. Government tried to address this issue by creating '*model towns*'. Apart from this, Government tried to cater housing shortage by implementing the Rent control Act.

Government also tried to solve acute housing shortage by creating state housing boards. It was observed that housing issues varied spatially and state housing boards were much more aware about the needs of local people. Government attempted to encourage private builders and cooperative housing societies to build housing for low and middle income group people. It envisaged the provision of loans from banks/insurance companies to private builders and cooperative housing societies for financing building construction that would be hypothecated to housing boards.

Additionally, reduction of building material costs and discouraging land holding by taxation on vacant lands were some of the key drivers by which Government attempted to solve housing problems.

It was also realized that the presence of proper institution setting could lead to further progress of housing development. Therefore, a few institutions were set up. Central Public Works Department (CPWD) was formed to implement all centrally-funded civil works. National Buildings Organization (NBO) was established to look into the matters of technology, building designs,

experimental developments and dissemination of housing statistics. Town & Country Planning Organization (TCPO) was created to chalk out Master Plan for Delhi & surrounding areas, as well as to suggest planning measures for steel towns.

1965 – 1990

During this period, regulatory restrictions of the government was stronger which might have stifled private players in housing market. In general, government had made a change in its approach in solving housing problems. *Environmental Improvement of Urban Slums (EIUS)* scheme was launched in 1972. Moreover, *Sites and Services Scheme* was launched in 1980. In these schemes, it was felt that poor people, who live in the tenements of slums, also save some money and gradually ameliorate their dwelling units. Hence, government focused on 'in-situ' development of slums, thereby enhancing the living environment (like road, water supply, sanitation and so on) and securing the land tenure status. Services like transport were extended to such slum areas, so that residents can easily move for work, and access education, healthcare and other facilities alike. It was argued that such policies would help urban poor by keeping their basic livelihoods intact. Clearance of slums, which was envisaged at the earlier phase, was not favoured anymore and 'relocation' of slums was considered as exceptional and unavoidable one.

It was also realized that only public financing through state housing boards was not sufficient. Therefore, finance institutions like Housing and Urban Development Corporation (HUDCO), Housing Development Finance Corporation (HDFC) and National Housing Bank (NHB) were set up. HUDCO was told to provide finance for sites and services and other construction programs of state housing boards. It was also mandated to keep at least 55 percent of its allocations for Economically Weaker Section (EWS) and LIG housing. On the other hand, HDFC primarily being a private sector entity, focused on lending money for middle and / or high income group residents. Following HDFC's success, a few private finance institutions also came up in funding housing projects. NHB was established in 1987 to regulate housing finance companies in India.

As a result of such changes, policies towards housing subsidies were partially replaced by cost recovery. Subsidies were more geared towards infrastructural works. Affordability became a key issue – around which different housing projects were earmarked.

Policymakers also noted that housing issues could not be solved in isolation. Augmentation of employment opportunities, improvement of basic services and infrastructure were also felt to be necessary. Hence, *Integrated Development of Small and Medium Towns (IDSMT)* scheme was launched in 1979-80. Initially, it targeted small & medium towns under a population size of 1 lakh, later it was extended for urban centres with 5 lakh population. It aimed to create and improve infrastructural assets like roads, bus terminus, shopping centres, street lights, drains, parks, marriage halls and so on.

Therefore, a concrete *National Housing Policy* was introduced in 1988. It streamlined the role of government as facilitator for market-led development of middle and high income group housing. It meant that Government would

chalk out a legal, financial and institutional framework, in which private players would provide houses to middle and high income group people. Provisioning of houses for poor people became the only core area of government. Reserve Bank of India (RBI) also took steps so that more funds remained available with individuals as well as builders.

1991 – 2000

In the year of 1991, Indian economy was made open for market-led development through the processes of liberalization and privatization. Following the guidelines of National Housing Policy (1988), government focused on provisioning of housing for urban poor – specifically – BPL, women-headed and SC/ST households. With the implementation of 74th Constitutional Amendment Act, the responsibility of urban poverty alleviation, by taking care of slums, was rendered on urban local bodies. Government launched *National Slum Development Programme (NSDP)* in 1997 to upgrade slums. The earlier programme of EIUS was integrated with urban basic services, having a new name of *Urban Basic Services for the Poor (UBSP)* to take care of health and education as well as tenurial security and cost recovery mechanism of dwelling units. Additionally, to take care of migrant workers who often live with low income informal jobs, Government introduced *Night Shelter Scheme for Pavement Dwellers* in 1990. HUDCO made efforts to provide loans and subsidies for the construction of such shelters. *Two Million Scheme* was launched in 1999 to construct two million houses every year by allocating funds from HUDCO and other housing finance institutions. Private market of housing finance also spread during this phase. In fact, a large number of commercial banks opened up wings for housing finance. In fact, individuals also started borrowing loans for housing as tax benefits and other financial attractions were lucrative to them.

Specifically, to enhance urban infrastructural development in large metropolitan cities, *Mega City Programme* was launched in 1991 and implemented in Bombay, Calcutta, Madras, Hyderabad and Bangalore. Key priorities of this scheme included transport, commercial development, housing, water supply, sanitation, slum improvement etc.

Apart from this, *Accelerated Urban Water Supply Programme (AUWSP)* was implemented in 1993-94 to cater to the needs of safe and adequate drinking water in the small towns (with less than 20000 population, as per Census 1991). It prioritized drought-prone, salinity-prone and water-borne disease affected small towns. It also encouraged the participation of ULB, NGO and local people in the implementation of approved projects. Central and State government jointly funded this scheme, including contributions from town/beneficiary. On sanitation front, Government implemented *Integrated Low Cost Sanitation (ILCS) Scheme* which aimed to (1) convert dry latrines into sanitary ones and (2) construct new latrines in EWS households who do not have latrines or defecate openly. Its funding pattern was - 75 percent central subsidy, 15 percent state subsidy and 10 percent beneficiary contribution. Earlier, the ceiling of a newly constructed latrine was fixed at Rs. 10000, which was increased further to Rs. 15000. In this scheme, NGOs played a vital role – starting from field survey to actual monitoring of latrine use by people.

2001 – 2022 (Continuing...)

The beginning of 21st Century clearly indicated the importance of cities as engines of economic growth. Cities were projected as pivots which balance multidimensional and composite nature of development across time and space. Government of India, therefore, launched a few schemes in housing and infrastructure fronts.

- In 2001, *Valmiki Ambedkar Awas Yojana (VAMBAY)* was launched to provide shelters to people living below poverty line. Shelters were planned to be newly constructed or to be upgraded under this scheme with an additional emphasis on living environment.
- In 2005, *Jawaharlal Nehru National Urban Renewal Mission (JNNURM)* was initiated. It had two sub- Missions for the Mission cities: (1) *Urban Infrastructure and Governance (UIG)*- mainly infrastructure projects like road construction, improvement of public transport, network building for water supply, sanitation, solid waste management, storm water drainage, redevelopment of old city areas were covered; (2) *Basic Services to the Urban Poor (BSUP)* - the main focus of this sub-Mission was to carry out integrated development of slums for providing shelter and other basic amenities. This Mission was also expected to cater to non-Mission towns and cities under two schemes: (1) *Urban Infrastructure Development Scheme for Small And Medium Towns (UIDSSMT)* - The existing programmes of Integrated Development Scheme for Small and Medium Towns (IDSMT) and Accelerated Urban Water Supply Programme (AUWSP) were colligated into it; (2) *Integrated Housing and Slum Development Programme (IHSDP)* - The existing programme of Valmiki Ambedkar Awas Yojana (VAMBAY) and discontinued National Slum Development Programme (NSDP) were subsumed under IHSDP. To satisfy the stated objectives of this mission, Government focused on making reforms in governance and financial framework. For example, repealing of Urban Land (Ceiling & Regulation) Act was a key step towards unlocking of lands for solving housing requirements. An 'integrated' house was planned to be developed with a total combination of living rooms, kitchen and toilet together.
- In 2011, *Rajiv Awas Yojana* was introduced to make cities and towns 'slum-free'. In this scheme, importance was given to accord property rights of slum dwellers and provide basic services in slums and low income settlements. It attempted to find suitable vacant land for rehabilitating them in affordable houses. It envisaged that 22-25 percent of developed land of all housing projects should be earmarked for EWS/LIG category. Both redevelopment of existing slums and relocation of slum dwellers in earmarked vacant land were incorporated within the guidelines of this scheme. In fact, the development of own or rented houses in notified as well as non-notified slums was encouraged. How did geographers contribute towards implementation of RAY? They had done digital mapping of slums and created a database for slum redevelopment projects and provision of new land for slum dweller rehabilitation.
- In 2015, *Pradhan Mantri Awas Yojana (Urban)* was launched which subsumed all earlier schemes of urban housing. It aimed to provide

standard all weather housing units (with water, kitchen, electricity and toilet) to eligible beneficiaries among whom women must be the owners / co-owners. It mainly targeted EWS/LIG and MIG category of people including slum dwellers.

- In 2015, *Atal Mission for Rejuvenation and Urban Transformation (AMRUT)* was introduced. While continuing earlier principles of capacity building and reform implementation, this scheme focused on water supply, sewerage, storm water drainage, urban greenery and public transport. It covered Class-I cities/towns, with particular emphasis on heritage and hill towns. It did not require project-by-project sanctioning by higher authorities of central government. To champion the cause of cooperative federalism, all projects form the annual action plan of the state, which was to be scrutinized and consequently approved by central government. This scheme also aimed to achieve step-by-step incremental benchmarks.
- In 2015, *Heritage City Development and Augmentation Yojana (HRIDAY)* was also initiated. It aimed to enhance urban infrastructure for the conservation of heritage of selected urban centres viz. Ajmer, Amritsar, Amaravati, Badami, Dwarka, Gaya, Kanchipuram, Mathura, Puri, Varanasi, Velankanni, and Warangal.
- Since 2020, Government is working on a sub-scheme called *Affordable Rental Housing Complexes (ARHC)* under PMAY. Awakened by the misery of migrant workers during COVID-19 pandemic, government is keen on this sub-scheme which aims to provide affordable and dignified rental houses to such workers and urban poor that are closer to their workplaces. As per the plan, vacant government funded houses would be converted into affordable rental houses and operation & maintenance of such houses will be executed through public-private partnerships.

Swachh Bharat Abhiyaan (Clean India Mission)

It should be noted that Swachh Bharat Abhiyaan has two components or Sub-Missions – SBA (Gramin) for rural areas and SBA (Urban) for towns and cities. While the first component is being implemented by the Ministry of Drinking Water and Sanitation, the second component is by the Ministry of Housing and Urban Affairs. This programme, launched in 2014, aims to clean India by 2019, and this is continuing till date. For this, the estimated cost is Rs. 62009 crores. SBA (Gramin) and SBA (Urban) focus on solid and liquid waste management and open defecation free environment, so that a clean and hygienic environment prevails in human settlements. SBA strives to increase sanitation coverage by cost effective solutions and by creating more awareness towards health and hygiene related issues through positive change in behavioural aspects.

What is new is its emphasis on the following aspects:

- Sustainability of constructed toilets and waste management facilities;
- Flexibility given to states, following the ideas of cooperative federalism;
- Involvement of various stakeholders so that SBA no more remains a mere government programme, rather becomes a mass movement. For instance,

a citizen can give his/her feedback on *Swachh Sarvekshan* and help his/her city to improve levels of cleanliness.

- Apart from government shares, SBA (Urban) plans to mobilize funds from private sector also as part of their Corporate Social Responsibility (CSR), and that is why '*Swachh Bharat Kosh*' has been formed. Government's seriousness towards SBA is evident from the introduction of '*Swachh Bharat Cess*' (at the rate of 0.5 percent on all taxable services) since 2015.
- SBA is also emphasizing upon the component of 'monitoring', even after a village gets '*Open Defecation Free*' (ODF) status.

SAQ 2

- What are focus areas of slum development schemes in India?
 - What is the significance of *Swachh Bharat Mission*?
-

16.4 SMART CITIES

You have learnt about the settlement policies and programmes, especially related to housing and infrastructure. On the path of progress, we are now talking about 'Smart Cities'. As a result, a few questions arise in our mind. What is this 'Smart City' all about? What features of 'smartness' are we planning to add in cities? What will be its viability? Just, think of a situation. You commute to your workplace daily through different modes of transport, first with auto rickshaw, second with metro and then finally with bus. You need to pay different amounts of fares by cash to each mode of transport. Will not be it smooth and hassle-free if you carry a common transport debit card and pay each mode of transport through that?

Although the term 'Smart City' came into urban literature in 1998 (Van Bastelaer), its meaning and connotations have varied to a great extent (Anthopoulos, 2015). From Information and Communication Technologies (ICT) controlled city to knowledge-based cities to eco-cities, the notion of 'smart cities' have merged in different ways in the literature. Government of India has launched National Smart Cities Mission in 2015 with "The purpose.... to drive economic growth and improve the quality of life of people by enabling local area development and harnessing technology, especially technology that leads to Smart outcomes." It has emphasized on 'residents' who require three points that a 'Smart City' should possess – 1) liveability, 2) sustainability and 3) thriving economy. That means, a 'smart city' should be *functional* and provide diverse opportunities to residents so that they can stay and enjoy a decent life. To achieve this, cities need to create and connect 'human capital', 'social capital' and ICT. ICT are portrayed as important tools for solving multifaceted challenges of cities – be it social, economic or environmental (Bolivar, 2015). Therefore, both government and private players are important stakeholders in the overall viability and management of smart cities.



Fig. 16.1: Smart Cities in India.

16.5 SUSTAINABLE CITIES

Do you know about ‘Sustainable Cities’? You may have heard about this term in TV, or have read a bit about it in newspapers. Let us know what it is all about.

16.5.1 Concept

Brundtland Commission (1987) defined ‘sustainable development’ as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” Cities are integral components of development. It is observed that majority of the cities are grappling with challenges like air pollution, noise pollution, traffic congestion, paucity of basic services like water & sanitation, waste management and so on. Therefore, cities need to adopt urban planning and management mechanisms that will improve environmental impacts. According to World Bank, *Sustainable cities are resilient cities that are able to adapt to, mitigate, and promote economic, social, and environmental change.* That means, a sustainable city should possess healthy living environment and address economic/financial, social and environmental issues.

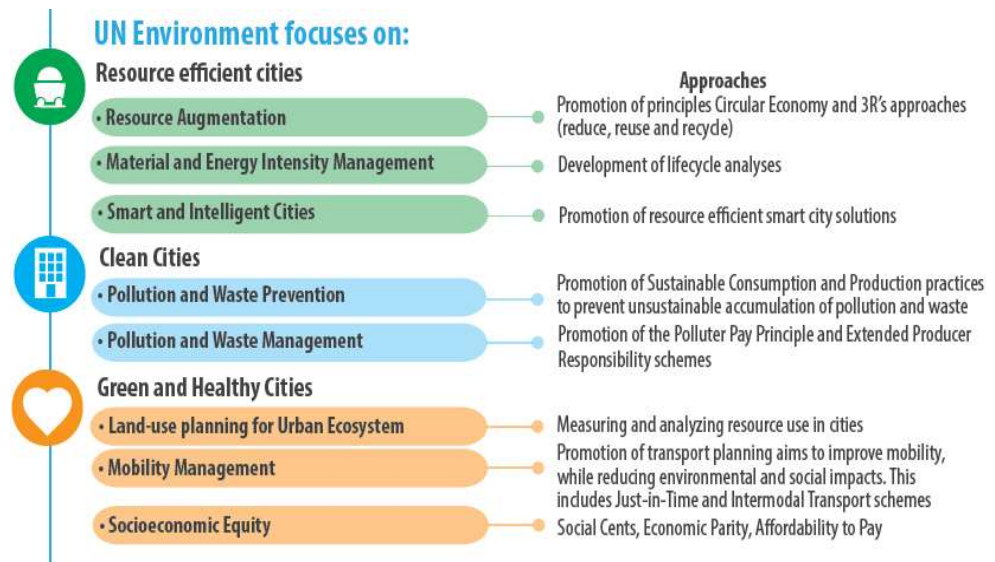


Fig. 16.2: Components of Sustainable Cities.

As you have been acquainted with the basic concept, let's go into a brief details – elements, examples and Indian scenario.

16.5.2 Elements

According to Cohen and Dong (2021), a sustainable city has four elements –

1. Social: values and perceptions leading to consumption and behavioural changes that reduce anthropogenic impact on environment
2. Political: laws and guidelines that support social values, consumption patterns and so on
3. Managerial: government and private sector creating organizational capacity that efficiently manages environmental issues
4. Financial: obtaining/ generating financial resources to operate and maintain sustainable infrastructure.

16.5.3 Examples

As 'sustainability' is a relatively new concept, no city has reached 100 percent of it in all respects. However, some of the following cities are working towards sustainability with definite time-bound targets –

- San Francisco, USA: with a ban on plastic bags and water bottles, and zero wastage policy
- Amsterdam, Netherlands: with a policy that encourages rapid use of electric vehicles by arranging citywide network of chargers
- Copenhagen, Denmark: with high investments on green technology and bicycle network
- Vancouver, Canada: with supporting green economy, jobs and local food this city produces lowest greenhouse gases in entire North America

16.5.4 Indian Context

Let's draw your attention to the fact that 'sustainability', in general, is a new concept in urban policymaking in India. You can see a few green & clean cities in India, like Mysore, Chandigarh, Bangalore, and Gandhi nagar. Now, note that, to achieve the target of net zero carbon emission cities by 2070, World Economic Forum and National Institute of Urban Affairs have signed a Memorandum of Agreement in February 2022. This aims to create an enabling environment for cities to gradually decarbonize in various sectors like energy, transport and built environment.

To achieve sustainable urbanization in India, four relevant aspects need to be addressed:

1. Reduce use of fossil fuel-based electricity in various buildings
2. Reduce energy use in urban transportation
3. Meet water demand in cities in a sustainable manner
4. Ensure effective management of municipal solid waste

SAQ 3

- a) Fossil fuel includes
(a) solar power, (b) wind power, (c) coal, (d) geothermal power
- b) _____ defined 'sustainable development' as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (Fill-in the blank)

16.6 SUMMARY

Infrastructure means a support system to government. In India, both union and state governments have focused on the infrastructural development of villages and urban centres through various policies and programmes. For infrastructure development in rural areas, governments have prioritized roads, electrification, housing, water supply and sanitation. For urban centres, the focus is housing as well as water and sanitation. Slums have been prioritized to promote pro-poor development. Over the years, basically the names of these schemes have changed, although the objectives and funding patterns have remained more or less same. Since 1991, under the domain of liberalization and privatization, government's role in infrastructural development has changed from 'provider' to 'facilitator'. Now-a-days, the participation of private sector, NGOs, and beneficiaries are being encouraged.

16.7 TERMINAL QUESTIONS

1. What are core areas of rural infrastructural development in rural settlements of India?
2. Briefly trace the outlines of slum development schemes.
3. What are the importance of Sustainable Cities?
4. Write a short note on – SMART Cities.

16.8 ANSWERS

Self-Assessment Questions (SAQ)

1. a) Households living under poverty and vulnerability are prioritized in government sponsored rural housing schemes. These includes SC, ST, Minority, landless households as well as households whose members are living in dilapidated dwelling units or engaged in vulnerable professions like manual scavenging.
b) The importance of holistic development of infrastructure in villages is necessary because the components of physical infrastructure like roads, water supply, electrification and sanitation are interlinked to overall progress and development – which is multidimensional, positive and dynamic in nature.
2. a) Slum development schemes have shifted focus from ‘clearance’ to in-situ development and upgradation of house clusters by emphasizing on components like durable housing, concrete roads, reliable water supply and standard sanitation system that are closely interlinked to livelihood options of slum dwellers.
b) The significance of *Swachh Bharat Mission* lies in its way of implementation through a mission-mode approach, thereby involving multiple stakeholders like common citizens, NGOs, corporate sectors and so on. It has also ensured flexibility among states and Union Territories so that the true spirits of cooperative federalism is maintained.
3. a) (c) coal
b) Brundtland Commission, 1987

Terminal Questions

1. The core areas of rural infrastructural development in India include housing, road, electrification, water supply and sanitation. Poor and vulnerable households are prioritized in housing schemes. All weather road connectivity is emphasized due to its linkages with neighbouring service centres like towns or cities. Potable water supply and toilet construction are also given due importance as these are closely interlinked to better health outcomes of villagers. In fact, overall development of infrastructure leads to suitable livelihood options for villagers and promote human development through health, education and income.
2. Earlier policies on slum development were focused on ‘clearance’ of slums. From 1980s, emphasis was laid to in-situ infrastructural development of slums. All-weather dwelling units, roads, potable water and sanitation were given due importance in such schemes. After the implementation of 74th Constitutional Amendment Act in mid-1990s, ULBs were given the responsibility of proper operation and maintenance of infrastructural facilities in slums. Since 2000s, all slum development schemes are emphasizing on in-situ development and upgradation of slums through holistic approaches of integrated houses and durable living units. Transport

networks and other facilities are being extended to slums so that livelihood options of slum dwellers remain intact.

3. The importance of sustainable cities lies in the fact that contemporary cities are engines of economic growth as these settlements generate a large chunk of Gross Domestic Product. As the world is getting more and more urbanized, especially in developing countries, it is imperative that a proper balance between development and environment is maintained. As majority of the cities are reeling under environmental degradation in today's world, multipronged strategies need to be streamlined so that each and every citizen can enjoy and extend their capabilities to participate in the process of growth and development. A healthy living environment remains the key to inclusive development of cities in particular and countries in a broader scale.
4. SMART Cities are those cities which are more liveable, sustainable and economically vibrant. All these are ensured through the use of ICT. In essence, various problems of the cities are solved by adopting and applying suitable technologies. An example of Dubai can be given as the local administration is operationalizing a mobile app that helps citizens to find a range of services from finding a cab to paying electricity bills in a single platform.

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Acknowledgements

Box – 1: PURA

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Box - 2: Bharat Nirman Yojana

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Fig. 16.1: Smart Cities in India

Researchgate, Sarbeswar Praharaj

https://www.researchgate.net/publication/334172302_Development_Challenges_for_Big_Data_Command_and_Control_Centres_for_Smart_Cities_in_India/figures?lo=1

Fig. 16.2: Components of Sustainable Cities

<https://www.unep.org/regions/asia-and-pacific/regional-initiatives/supporting-resource-efficiency/sustainable-cities>

GLOSSARY

Behavioural Theories of Settlements	: Behavioural theories of settlements attempt to explain the existing patterns of settlements in a region.
City Region	: It is that region which has functional links with the city, the major functions being work, dwelling, recreation and transport.
Compact Settlement	: In this type of settlement, the houses are close to each other and inter-building spaces are small.
Conurbation	: The term invented by Patrick Geddes to describe constellations of cities sprawling together.
Dispersed Settlement	: In this type of settlement, buildings are spread over a large area, and inter building spaces are large.
Dry-point Settlements	: These are the sites that avoided the risk of flooding. For examples, in marshy areas, higher ground that is little away from water body can prove to be a favourable site.
Ekistics	: The scientific study of human settlements, drawing from several disciplines, including architecture, city planning and social sciences.
Megalopolis	: The megalopolis is defined by its poly-nuclear characteristic, where, large cities are joined by a continuous chain or complex of cities.
Morphology of Settlements	: It refers to the layout or the internal structure of the settlement.
Neolithic Period	: The stage or cultural evolution or technological development characterised by the use of stone tools and the existence of settled villages dependent on domesticated plants and animals.
Normative Theories of Settlements	: Normative theories of settlements are not concerned about the existing patterns rather attempt to define an ideal system of settlements.
Patterns of Settlements	: It means the geometrical shape that the houses in a settlement acquire. Pattern can be- linear, rectangular, square, circular, amorphous, T-shape, L-shaped, star-shaped etc.
Rural-Urban Fringe	: The rural-urban fringe is the transitional zone in which the influence of the urban centre decreases categorically, while the rural characteristics take over.
Site	: It refers to the actual location of the village. It is related to the physical surrounding.
Situation	: It refers to the culture, economy and political set-up of the settlement. Therefore, situation covers the

Slum

socio-economic aspects of the settlement.

: UN-HABITAT defines a slum household as a group of individuals living under the same roof in an urban area who lack one or more of the following: (i) Durable housing of a permanent nature that protects against extreme climate conditions; (ii) Sufficient living space which means not more than three people sharing the same room; (iii) Easy access to safe water in sufficient amounts at an affordable price; (iv) Access to adequate sanitation in the form of a private or public toilet shared by a reasonable number of people; (v) Security of tenure that prevents

Spur-Line Settlements

: Settlements those are located in valleys in mountainous and hilly areas.

The Central Business District

: It is the central area of the city. In common parlance, it is known as the “downtown”. It is primarily characterised by retailing of goods and services, office activities and major service providences.

Types of Settlements

: It refers to the nearness of the houses in an area. There are four types- compact, semi-compact, dispersed and farmstead.

Urban Sprawl

: Urban sprawl refers to the pace of land conversion to urban use and magnitude of areal expansion of the city.

Wet-Point Settlements

: These are the sites close to a supply of water. For example, in desert areas, oasis or any other source of water acts as a favourable site for settlement.