PRASĀRĀNGA
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SOME ASPECTS OF URBANISATION

BY

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Professor of Geography, Delhi University, New Delhi

UNIVERSITY OF MYSORE

Special Lecture Series—33

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PRABHU SHANKARA
Director

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V. L. S. PRAKASA RAO

LECTURE ONE

Extension Lectures: Geography Department
Mysore University

SOME ASPECTS OF URBANIZATION

The Urban Civilization and Scale

Urban life* is believed to be as old as agricultural life. Urbanization as a phenomenon is both ancient and modern, and the city was the base of both ancient and modern civilization. If the ancient is identified with Asian civilization, the modern is identified with Western Civilization. The 20th century is the century of metropolitan civilization, an outgrowth of the industrial civilization, the core of Western Civilization. Thus the Civilization in the world synchronised with urban life: the city life. The thinking today seems to be that 'the ultimate solution of city problems is to abolish the city . . . solve the city problems by leaving the city.' This only reflects the underlying discontent with modern urban life.

There are six stages of city development according to Lewis Mumford. The first is 'Eopolis', the rise of the village community with permanent habitation. The second is 'Polis', an association of villages with a common site. This is essentially a town for defence. The third stage is metropolis

* Mankind congregated in towns for security, welfare or trade. With the march of time, the foundations of town-hood became complex and varied. In the past, a town was established as an instrument of military conquest or as 'a city of God or King'. In this manner, the castle and cathedral towns of Europe and the fort and temple towns of India developed. During and after the 18th century, industrial and mining towns developed, and these are 'atypical' towns.

or mother city. The fourth is megalopolis, the beginning of the social decline of the human community. The fifth stage is 'tyrannopolis, an urban pattern which is parasitic' and the sixth and the final stage is 'Nekropolis' with ghost towns, the manifestations of war, famine and disease. In contrast to this horrible city of the future, we have the 'invisible city', the product of revolution in communications and electronic transmissions. Even the remote village can have the urban component of life, and yet avoid the city, we do not want to live in. There is yet another stage: 'Doxadis's Dynopolis' not only for the man but also for this cars, aeroplanes, helicopters, and maybe rockets.

Spatial urban Patterns

Like the large range in the urban growth, there is a large range in the spatial urban patterns, at different regional levels. The world patterns of distribution of urban population (towns with more than 20,000 population) has co-variation between per cent of urban population and national wealth, as measured by the gross national product *per capita*. At the global level, the generalization is, the greater the city population in a country, the greater its wealth, and this means, greater social and economic inter-action within the Nation. Here, a distinction is made between the level in the urban scale and urban awareness, and familiarity, comprehensible to the rural inhabitants of the country. In the most urbanized countries like United Kingdom, there is urban-rural continuum while in a country like Ethiopia, 'a city is a little known enclave of foreigners to the rural folk.' In between these two extremes, there are countries like China where the civilization has been basically urban oriented. But such a pattern can never be static, and is rapidly changing with the changing transport and communication system. World urban patterns emerge also in the patterns of urban primacy. High

primacy is associated with lower income countries, and those, which are recent entrants on the old political stage. Thailand is an extreme example under this category. There is the second group of countries with high primacy with high income and urbanization rates. Contrary to both, India has a high degree of primacy. Such are the urban patterns at the global level using simple measures of urban patterns.

We can also identify distinct urban realms: the Western and the Asian. Here we can look for evidences both at the level of the Realm and also at the level of the patterns within the cities. In Asia, urbanisation has over-run its economic base and the rural-urban dichotomy is very sharp, as evident by the sharp urban-gradients. Cities are growing more by immigration than by natural growth, and that, out of tune with the city's employment potential. The city core is over-crowded without a strong economic base and urban infra-structure and minimal living amenities. In the Western Realm, there is a trend towards commutation and the development of regional cities though this is being interrupted by green belts or buffer zones, as in the RANDSTAD. Through metropolitanization, the cities are developing as members of a regional urban system, as in Rhur. The urbanization pattern in America is such that there is a faster decay of the cities than they are rebuilt. Both the industries and the white population are moving only to the periphery eroding the city's tax base and also developing environmental anomalies (Weissmann). In Netherlands, the urban structure and pattern are being geared to motorised community with a new way of urban living. The suburban structure is characterised by lower residential densities, higher income groups and high urban amenity costs.

In between the two Realms, there is a mixed pattern of the Western and the Asian. India is a typical example even with an urban tradition behind, in the historic cities of the

Gangetic plain, unlike the cities of Africa and South East Asia.

The port cities like Bombay and Calcutta and the twin cities like Delhi—New Delhi and Hyderabad—Secunderabad can be classified as hybrids between the two Urban Realms. The dichotomy between the old city and the new city is clear-cut. 'The Indian cities are identified as post-industrial cities inhabited by pre-industrial societies' and their rate of transformation is slow (Ginsburg).

Based on 31 criteria relating to processes associating cities and cultures (historical influence, mutual economic, technological, and demographic relations, ethnic religious and socio-political relations), Holzner grouped the urban complex and characteristic composition into major urban regions with several sub-regions. These regions 'constitute areas within which certain processes are active both in time and space.'

Urbanization: Geographical Aspect

Urbanization has different aspects: the main aspects are economic, social, physical and geographical. Here, we shall examine the geographical aspect in some detail. The geographical aspect of urbanization is 'human organization of space.' Geographer studies urbanization primarily as a spatial process: increase, decrease or stagnation in the number of towns of different population sizes and the sizes of individual towns in a region. Consistent with this, there is the concentration or scatter (or both) in the distribution of towns. Eldridge goes to the extent of stating: 'as soon as population concentration stops urbanization stops.' In a regional setting, a town is a point location, absolute and relative. A town is not considered as an isolated and a closed unit, and is even more than a part of its hinterland. A town is a component

of the whole urban system which is both spatial and functional. An urban system could be local, regional, national and inter-national (Fig. 1).

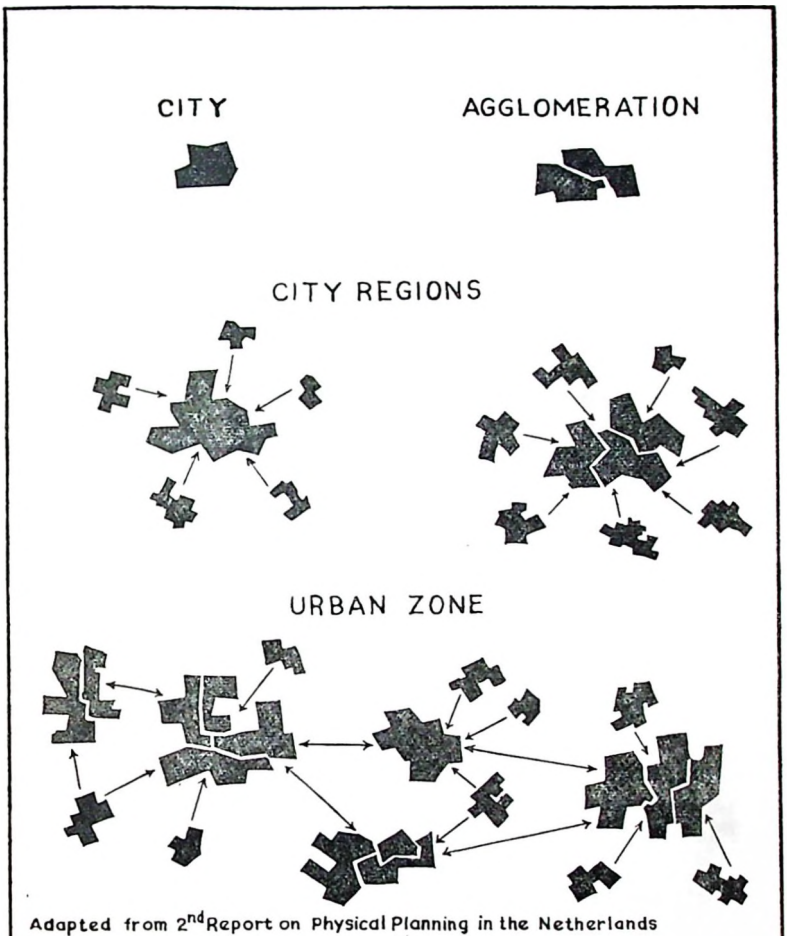

FIG. 1

At a micro level, functionally, a town is a part of its hinterland, though all towns do not necessarily develop hinterlands. As the distribution of towns is uneven, the distribution of hinterlands, is uneven, resulting in overlaps, and distortion in size and shape. This results in the distortion of the regular shape which is a circle or a hexagon. If there is any regularity in the distribution of town-sizes and numbers, it is the highly skewed frequency distribution, statistically, and uneven distribution spatially. An analysis of Nearest Neighbourhood Distance in Telangana for 1931 and 1961 brings out that the pattern of locational change is from random (R = 1.0637) to even distribution (R = 1.2269).

Linkages

An equally important aspect of the studies of urban pattern is the study of linkages. A urban system consists of inter-connected and interacting parts (places). Analysis of nature of the inter-connections between cities should reveal the hierarchical ordering of the centres and the extent of their respective areas of dominance. Further, the degree of connections between places in the urban system, would tell us something about the coherence of the system, or lack of it. A complete understanding of the urban system is, therefore, only possible by examining the interactions (linkages) between places in the system.

The linkages paths of 104 Indian cities with a population of 100,000 or more in 1961 have been shown in Figure 2. These refer to paths of dominant interactions between places: they have been theoretically derived using the gravity concept of interaction between places in which interaction is assumed to be a function of distance and population.* The map

* For preparing the map, the intensity of interaction of each city with all the other 103 cities was computed using the formula $I_j = \frac{P_j}{d_j}$,

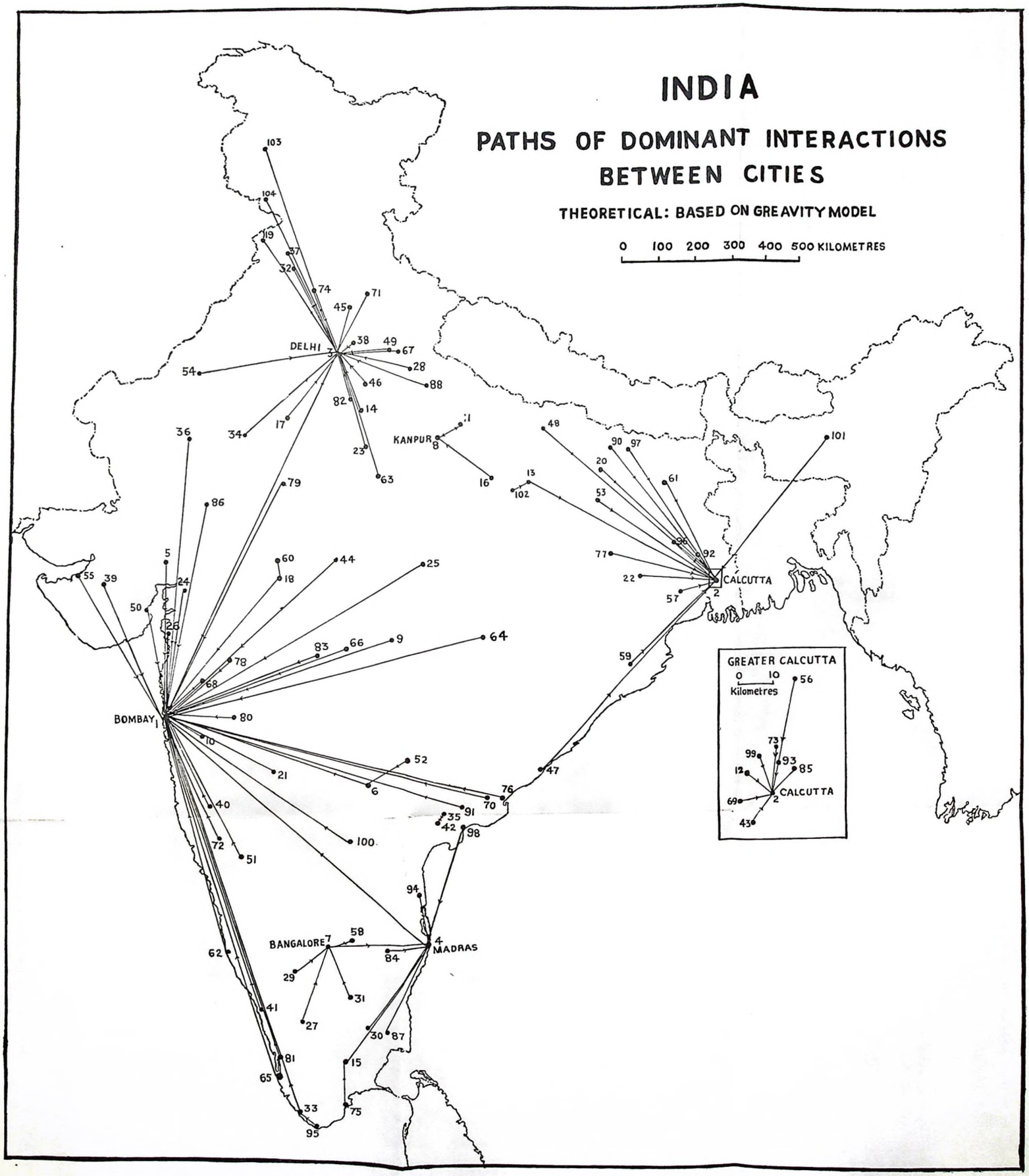
INDIA
PATHS OF DOMINANT INTERACTIONS
BETWEEN CITIES
THEORETICAL: BASED ON GREAVITY MODEL
0 100 200 300 400 500 KILOMETRES
DELHI
KANPUR
CALCUTTA
BOMBAY
BANGALORE
MADRAS
GREATER CALCUTTA
0 10
Kilometres
CALCUTTA

FIG. 2

reveals the existence of several nodal urban-sub-systems focusing on Bombay, Calcutta, Delhi and Madras. In addition independent sub clusters of urban centres exist with reflexive interaction patterns, e.g. Allahabad, Kanpur and Lucknow, and Guntur-Vijayawada.

In Figure 3 the analysis of linkages represents an initial step. A complete analysis of linkages should take into account the interaction between each place in the system with every other place (i.e. a matrix of 104 × 104 interactions). At this stage, it will be useful to apply graph theoretical constructs in order to explain the degree of connectivity of the system, and the structure of linkage patterns. Further, graph theory can help in the identification of urban hierarchy and in isolating areas poor or rich in urban development. The dynamics of the urban system can also be examined if the same graph theory constructs are applied for successive census periods (Kansky, Hagget, and Nystuen and Dacey).

One of the results of practical value from regional urban analysis is an attempt to construct urban development model for an area/region. The Planning Commission Project on Muzaffarnagar District clearly brought out that the District has a five-levels of urban functions, with functional gaps between different levels. Geographical distances between towns are very uneven. Our survey of resources, transport accessibility, the pattern of agricultural change and consumer travel patterns suggested that the District should have only three levels of urban functions (Fig. 4).

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where I_j is intensity of interaction with city j, P_j is population of city j and d_j is distance to city j. The city that had the maximum I_j value was found out and the two cities were connected by a path/line on the map. This method was repeatedly applied to all the remaining cities and the map completed.

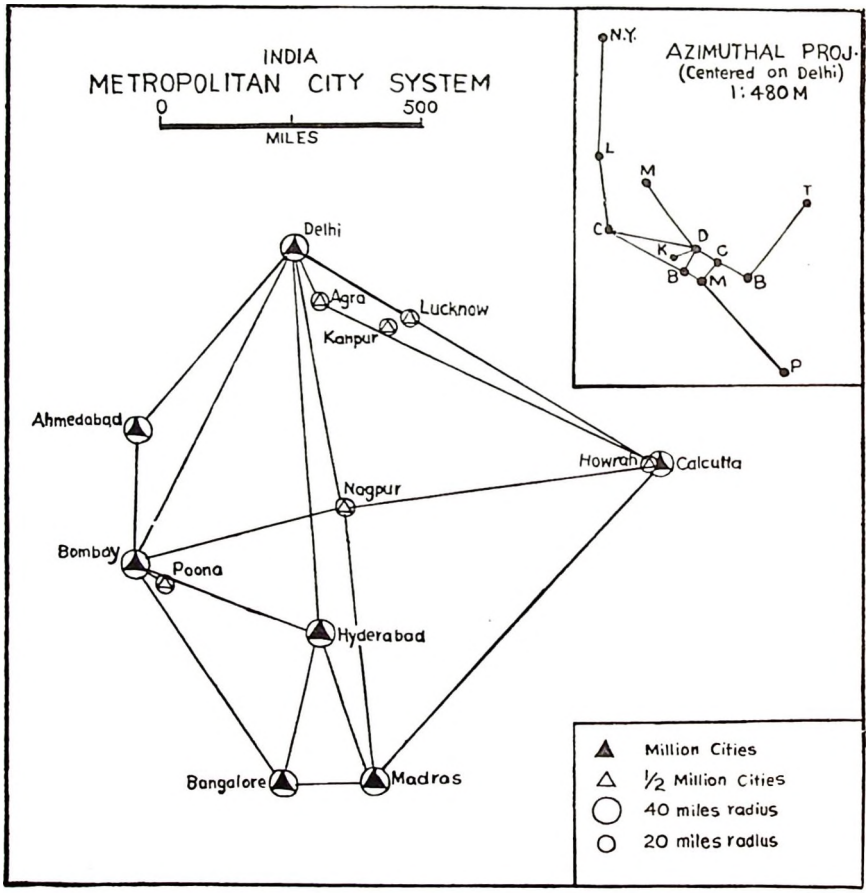
INDIA
METROPOLITAN CITY SYSTEM
0
500
MILES
AZIMUTHAL PROJ.
(Centered on Delhi)
1:480 M
N.Y.
L
M
T
C
D
K
C
B
M
B
P
Delhi
Agra
Lucknow
Kanpur
Ahmedabad
Howrah
Calcutta
Nagpur
Bombay
Poona
Hyderabad
Bangalore
Madras
Million Cities
½ Million Cities
40 miles radius
20 miles radius

FIG. 3

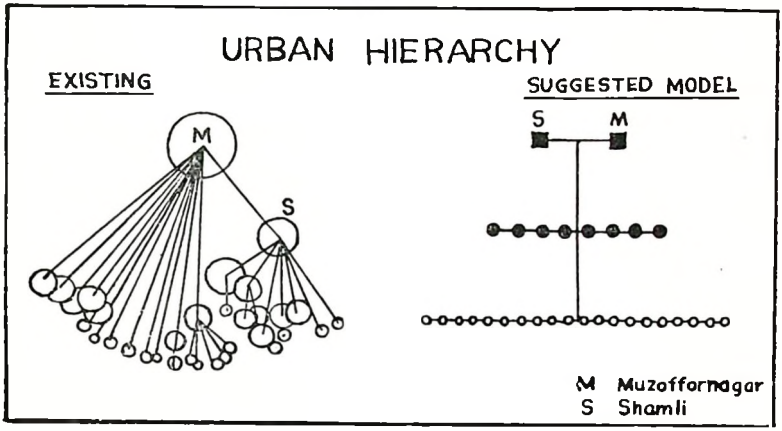

FIG. 4

Classification of Towns*

Classification of towns is a common field to all scholars of urbanization. In the earlier classifications, as in the classification of regions, the scholars did not make their methods explicit. The earlier approach to classification was subjective, arbitrary and descriptive. The main criterion was the dominant function, as indicated by the dominant occupation for which statistics are readily available. It is easier to

* Classification of towns based on only one urban component should be distinguished from typology of urban areas, to understand process of urbanization in the context of universal and comparative patterns as well as individual towns.' Political-intellectual and economic cities', generative and parasitic cities', 'ortho-genetic and heterogenetic cities', 'Pre-industrial, industrial and metropolitan cities' are selected examples of classical, typologies. It is retreating step to think that a useful and comprehensive typology of urban centres cannot be devised because of data limitations, wide range of scales and types of urbanization and its multi-aspect and complex character.

identify the town type in 'atypical' towns as they are mostly single function towns, and that, during the initial years of town formation. As the town grows in population size, the tertiary sector dominates the occupational structure, and large towns, as a rule, are multifunctional. These characteristics are illustrated in Table 1.

TABLE 1

Selected Towns: Occupational Structure: Percentages

Towns	Primary I, II & III*	Household IV	Factory V	Construction VI	Trade and Transport VII & VIII	Other services IX	Size class
Jamshedpur	1.83	1.51	53.00	6.95	15.08	21.64	Class I City
Asansol	1.81	0.51	38.60	2.43	33.34	23.31	Class I City
Kharagpur	1.80	0.51	22.61	1.61	53.02	20.45	Class I City
Kothagudem	57.52	5.08	3.55	4.23	13.84	15.79	Class II City
Vijayapuri	2.48	2.35	2.92	74.44	6.25	11.57	Class II City
Guntakal	18.79	5.47	10.00	2.88	42.10	20.76	Medium Town
Yellandur	36.51	8.87	5.05	3.21	21.06	25.30	Small Town
K.G.F. (Kolar Gold Fields)	70.44	2.04	2.73	1.04	9.14	14.61	Class I City
Arsikere	6.64	5.87	11.70	7.70	32.77	35.32	Small Town

*Census category

The greater, the number of urban characteristics, the more complex the classification becomes, and the greater the need for objectivity and sophisticated techniques. Here not only the variables are numerous but also their units of measurement and their very character are different. Another object is to minimise or eliminate arbitrariness.

Urban characteristics could be economic, social, cultural and some relate to growth, and others to density and even characteristics like compactness. The problem is how to combine them and derive categories.

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Urban characteristics could be economic, social, cultural and some relate to growth, and others to density and even characteristics like compactness. The problem is how to combine them and derive categories.

TABLE 2

Telangana Towns (1961 Census data)

Classification of town types based on Standard Deviation (SD) and least squares Linear Regression (LSLR) techniques.

Mining (M)	Agriculture (A)	Household Industry (HI)	Factory Industry (FI)	Construction (C)	Commerce & Trade (C T)	Transport & Communication (T)	Other Services (OS)	Bi-functional	Multi-functional	No function dominating
Bellampally*	Cherial*	Utkar*	Domakonda*	Kadamdamsite*	Narsampet	Manthani*	Bhadrachalam*	Madira* (OS,T)	Narayankhed (OS,HI, A)	
Kothagudem*	Parkal*	Pevarakanda*	Koratla	Vijayapari*	Faruqnagar*	Dornakal*	Sangareddy*	Nagarkarmool (OS,A)	Vemulawada (OS,HI,CT)	
	Makthal*	Kosigi*	Kagaznagar*		Badepalli		Adilabad*	Hazurnagar (A,C)	Chinnoor (OS,HI,A)	
	Kalwakurthi*	Sircilla*	Bodhan		Miryalguda*		Karimnagar	Suryapet* (OS,CT)	Metpalli (HI,A,FI)	
	Kodangal*	Armoor*			Vikarabad*		Nalgonda	Medak (A,OS)	Kamareddy (OS,CT,A)	
	Mudhole*	Gadwal*			Jangaon		Mahabubnagar	Jagtial (HI,CT)	Jagipet (CT,OS,HI,A)	
	Hasanparthy*	Siddipet*			Bhainsa*		Khammam	Peddapalli* (OS,CT)	Yellandu (CT,OS,M)	
	Kollapur*	Narayampet*			Zahirabad*			Asifabad (OS, A)	Sadasivpet (HI,A,CT)	
	Banswada*				Tandur*			Shamsabad (A,CT)	Wanaparthy (HI,CT,A)	
	Kohir*								Mahabubabad (OS,A,T)	
	Aler*								Mancherial (FI,T,OS,CT,C)	
	Alampur*								Bhongir (CT,OS,FI,T)	
									Nirmal (FI,OS,CT)	
									Nizamabad* (OS,CT,T)	
									Hyderabad (OS,CT,T)	
									Warangal (CT,FI,HI)	
2	12	8	4	2	9	2	7	9	16	

Town Types Based on Standard Deviation Technique

Mining (M)	Agriculture (A)	Household Industry (HI)	Factory Industry (FI)	Construction (C)	Commerce & Trade (C T)	Transport & Communication (T)	Other Services (OS)	Bi-functional	Multi-functional	No function dominating
Bellampalli*	Cherial*	Utkur*	Domekonda*	Kadam Dam Site*	Faruqnagar*	Manthami*	Bhadrachalam*	Madira* (T,OS)	Nizamabad* (A,FI,CT)	Samshabad
Kothagudem*	Parkal*	Devarakonda*	Nirmal	Vijayapuri*	Miryalguda*	Dornakal*	Sangareddy*	Suryapet* (CT,OS)	Narsampet (CT,OS,FI)	Kamareddy
	Makthal*	Kosigi*	Kagaznagar*		Vicarabad*		Adilabad*	Jagtial* (A,HI)	Badepalli (CT,HI,T)	Wanaparthy
	Kalwakurthi*	Sircilla*			Bhainsa*		Chinnur	Peddapalli* (CT,OS)	Nalgonda (A,C,OS)	
	Kodangal*	Gadwal*			Zahirabad*		Narayankhed	Koratla (FI,HI)	Mahabubnagar (A,C,T)	
	Mudhole*	Siddipet*			Tandur*		Asifabad	Yellandur (FI,CT)	Khammam (CT,T,OS)	
	Hasanparthy*	Narayampet*			Jogipet		Nagarkarnool	Metpalli (HI,FI)	Warangal (CT,FI,HI)	
	Kollapur*				Bhongir		Vemulawada	Jangaon (FI,CT)	Hyderabad (OS,CT,T)	
	Banswada*						Mahabubabad	Armoor (HI,FI)		
	Kohir*							Mancherial (FI,T)		
	Aler*							Sadasivpet (HI,CT)		
	Alampur*							Bodhan (FI,A)		
	Huzurnagar							Karimnagar (T,OS)		
	Medak									
2	14	7	3	2	8	2	9	13	8	3

* Common Towns

Inspired by the work of Moser and Scott, Qazi Ahmad classified Indian cities based on sixty two original variables, condensed to ten factors, applying factor analysis, a technique which eliminates the problems associated with weighing and scaling.

In the above exercise, the dictum is inter group differences should be more than intra-group differences.*

In any classification, the objective must be clear, definite and consistent. Even in the classification on functional basis, there can be more than one objective: to group on the basis of dominant function or on the basis of similarity in function.

As an experiment, Venugopal applied two techniques of classification to Telangana towns and the results are presented in Tables 2 and 3.

TABLE 3

Classification of towns by LSLR and SD Techniques: Summation

Occupations	LSLR	SD	Common Towns
1. Agriculture	12	14	12
2. Mining	2	2	2
3. Household Industry	8	7	7
4. Factory Industry	4	3	2
5. Construction	2	2	2
6. Commerce and Trade	9	8	6
7. Transport and Communication	2	2	2
8. Other services	7	9	3
9. Bi-functional	9	13	4
10. Multi-functional	16	8	1
11. No function dominating	...	3	...
Total	71	71	

* Here the aim is not just to identify the different types but to handle a large and varied data adopting systematic and statistically valid procedures.

The inferences from the table are (i) there is no significant difference in the results in the functional types from 1 to 8. In fact in the types 1, 5 and 7, there is no difference at all between the SD* and LSLR† techniques.

(ii) There is a significant difference in the result under bi-functional and multi-functional types. (iii) A new category of functional types emerges under SD, technique: three towns with no function or functions dominating.

One explanation for this difference is that in LSLR technique, both function and size are taken into account, while the SD technique is only uni-dimensional.

What is important in any exercise in classification is not just the technique, as no technique can be an optimal technique, but it is the objective of classification. The 'power' of the data is equally important.

Urbanization and Planning

In our first five year plan, the problem of urbanization was identified with the problem of increasing housing shortage in urban areas, as a consequence of heavy shifts of population from rural to urban areas. The second plan marked the expansion of the housing programme of the first plan and consisted of slum clearance, slum improvement and land acquisition and development. In the third plan, for the first time, it was recognised that 'housing policies need to be set in the larger context of economic development and industrialisation.' It was decided to prepare master plans and regional development plans for metropolitan and industrial cities. The third plan did widen the horizon for urban development planning. Urbanization was recognised as an important

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* SD: Standard Deviation.

† LSLR: Least Squares Linear Regression.

aspect of the process of economic and social development, and the social aspects of urbanisation, particularly the need for developing urban services and amenities was stressed. The following are the main ingredients of the development policy which have a bearing on urbanization: (1) new industries to be established away from large and congested cities, but how far from a city, is any body's guess; (2) the rural and urban components in the community development projects should be knit together to strengthen the economic interdependence between the town and its adjoining rural area. The fourth plan definitely strikes a new ground in urban planning, which includes the expansion of urban community development, started in the third plan. In the fourth plan, there is awareness of the planners to spatial implications and problems of urbanization. The emphasis on regional urban plans, though these are regional extensions of master plans, can be taken as an evidence. The objective to 'harmonize all activities inscribed on land' seems to be more theoretical and what is needed is an operational strategy for urban development, as a part of the strategy for overall regional development. The very purpose of the future pattern of urbanization has to be restated with reference to the new thought that is emerging in urban planning: to use urbanisation as a lever to initiate development. Then, it is the future pattern of urbanization that provides the frame for industrialization and not vice versa, as it was earlier.

LECTURE TWO

Extension Lectures: Geography Department
Mysore University

CARTOGRAPHIC TECHNIQUES OF URBAN ANALYSIS

In this lecture, I shall enunciate and discuss some of the cartographic principles and techniques of urban analysis.

Principles

It needs no mention that all the urban variables need not be mapped. Here the principle is that the variable should be 'mappable' for cartographic analysis. This means that the variable is related to the spatial character i.e., structure and linkage, either in cause, consequence or geographical position. The map provides the base for measurement and hence there should be map accuracy. Here, the function of the map is not to provide a visual aid. A map on different scales showing the occupational structure of towns by located and sector diagrams is more for a better visual aid to comprehend regional contiguity and variations, and does not provide an accurate base for regional urban analysis.

The cartographic techniques are related to the map scale: field scale, micro, meso and macro and the size of the mapping unit. Here again, the scale for better comprehension is different from the scale for analysis. Our experiments have shown that for large areas, meso or macro regions, while one million scale is useful for analysis, two million scale is useful for better comprehensions. The area patterns just start getting distorted or coalesce on 4 million scale. Measurements particularly distance measurements should be made on quarter

inch scales. Like the definition of a town, the definition of the town area creates problems. On a macro scale, a town is a point location, and hence the town area has no significance, unless the size is so large, as in conurbations. The problem is how to make the legal or the administrative city more realistic in terms of the 'real city' which often overflows the municipal or corporation city boundary (Fig. 5).

The genetic and symbolic character of the variable to be mapped determines the technique. Here the true character of the symbol should be distinguished from the cartographically transformed character. The points, lines and areas can be genetic and can also be derived or transformed. On one scale, a town is an area, and it becomes a point on another scale. Through scale transformation, there is a possibility of deriving a cluster pattern, giving a false image as it were. Here the geographical distance and the mode of travel decide the cluster character. In a regional framework, a node is a point and transport routes are lines. A power transmission line is really a line unlike a highway.

While the purpose of analysis decides the choice of a technique, which is related to the map scale, there is a case for the cartographic techniques to be supplemented by tables and graphs, both for quantitative summation and eliminating the inherent limitations in certain techniques like isoline and choropleth. Where there is distinct lineation in regional structure and alternation of patterns in space and where there are distinct urban gradients, regional line or strip profiles and graphs should supplement the isoline and choropleth techniques.

Conceptual/theoretical framework

With increasing emphasis on objective approach, quantification and prediction, the need for conceptual and theoretical framework in cartographic analysis becomes greater. In this

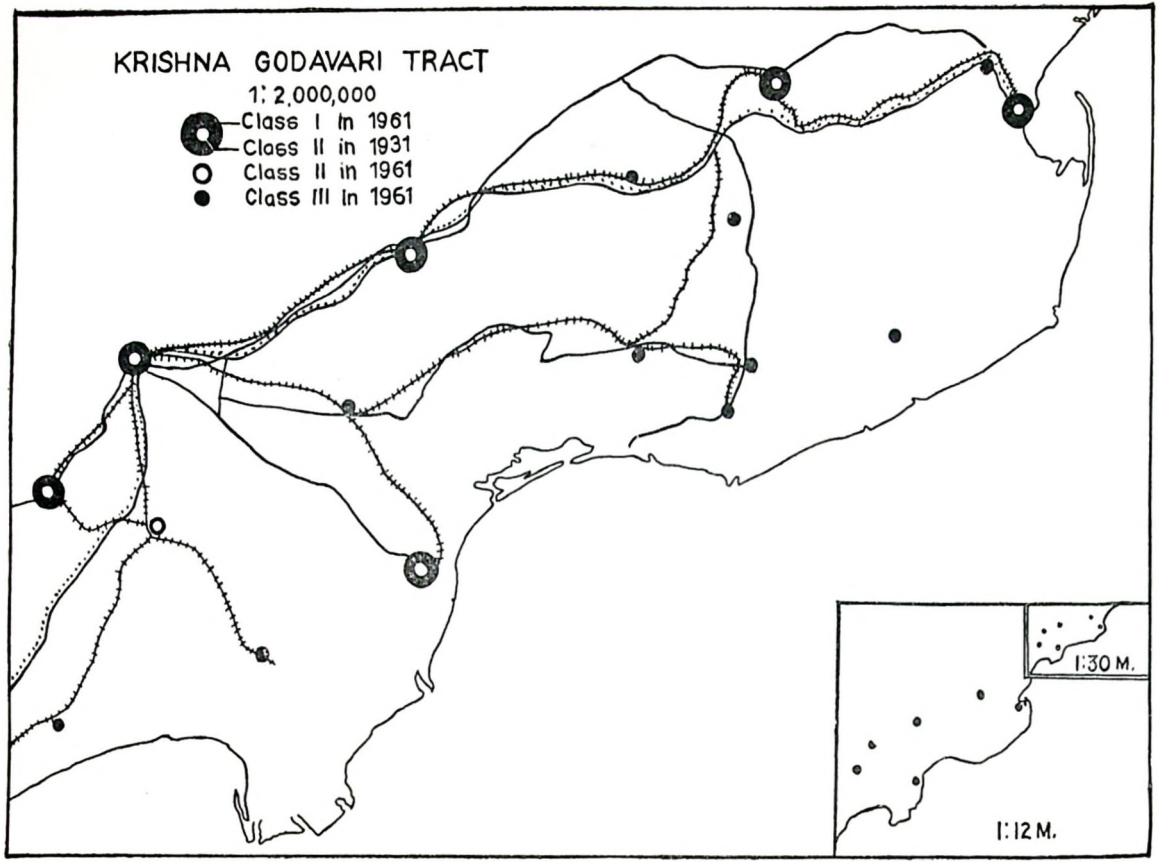
KRISHNA GODAVARI TRACT
1: 2,000,000
Class I in 1961
Class II in 1931
Class II in 1961
Class III in 1961
1:30 M.
1:12 M.

FIG. 5

context, the map is more than a storage or a visual device. Under given assumptions (e.g. of homogeneity, technology, and gravitational pull of a city) and known independent or inter-related inputs, the map can be used to extract or extrapolate outputs. It is here, the map becomes a tool for synthesis and prediction. A map could be used for local and regional zoning.

In urban analysis, the concepts of city region, central places, urban-hierarchy, urban shadow and urban gradient are important. The theory of cellular growth (an extension of the biological concept to town growth), which involves the recognition of organismic concept (town as an organism), and the theory of graphs, which has a great scope for application in the analysis of variables, having a linear form (transport network), are two typical examples of theoretical conceptual approach in urban analysis.

Select Techniques

Isarithmic techniques

How far isarithmic techniques are appropriate for mapping the distributional patterns of town-size or urban growth is a valid question. Here the agglomerative character of the process of urbanisation must be recognised. Where the pattern consists of sharply differentiated size classes, a combination of isarithmic and located symbols brings out the distributional pattern more clearly and realistically. Base-mapping on 1 : 1 M scale by the combined method brings out clearly intra-state variations in the distributional patterns of urban population.

About the value which is used in drawing isarithms, it may be claimed that index of concentration of urban population is a refined measure of urban concentration than a simple percentage of urban population to total population. It is

paradoxical to note that there is no significant difference between the two measures, in revealing the areal/regional patterns. A number of exercises for different components may be tried to resolve the paradox.

Where dissimilar and related distributions (geographical and statistical) are involved, and where the variables have both area and sector dimensions, the problem is how to combine them.*

The Figure 6 illustrates that isopleth, choropleth and regional profile techniques are complimentary, and hence all the three techniques are necessary in cartographic analysis.

Geometric techniques

Here, the geometric figures are symbolised to represent different types of data. Modifications are many. There are innovations (e.g. piled symbols like piled coins and the symbols can be proportional).

The geometric techniques can be more than just translation of statistical data to geometric figures on maps. To illustrate, there are several measures of urban concentration in a region/area. The percentage of urban (geometric) area to total area is a useful measure. The percentage is more than a statistical value. The concept of urban area calls for an explanation. An urban area has a geographical extent and intensity of urban influence. The limits of urban influence are indicated by a geometric figure, generally speaking, a polygon, which is obtained on a map, by drawing straight lines connecting all the outer-most locations of towns in a given area. The assumption, by and large is, the larger the urban geometric area, and greater the number of towns,

* What is the geographical significance or interpretation of log-transformation?

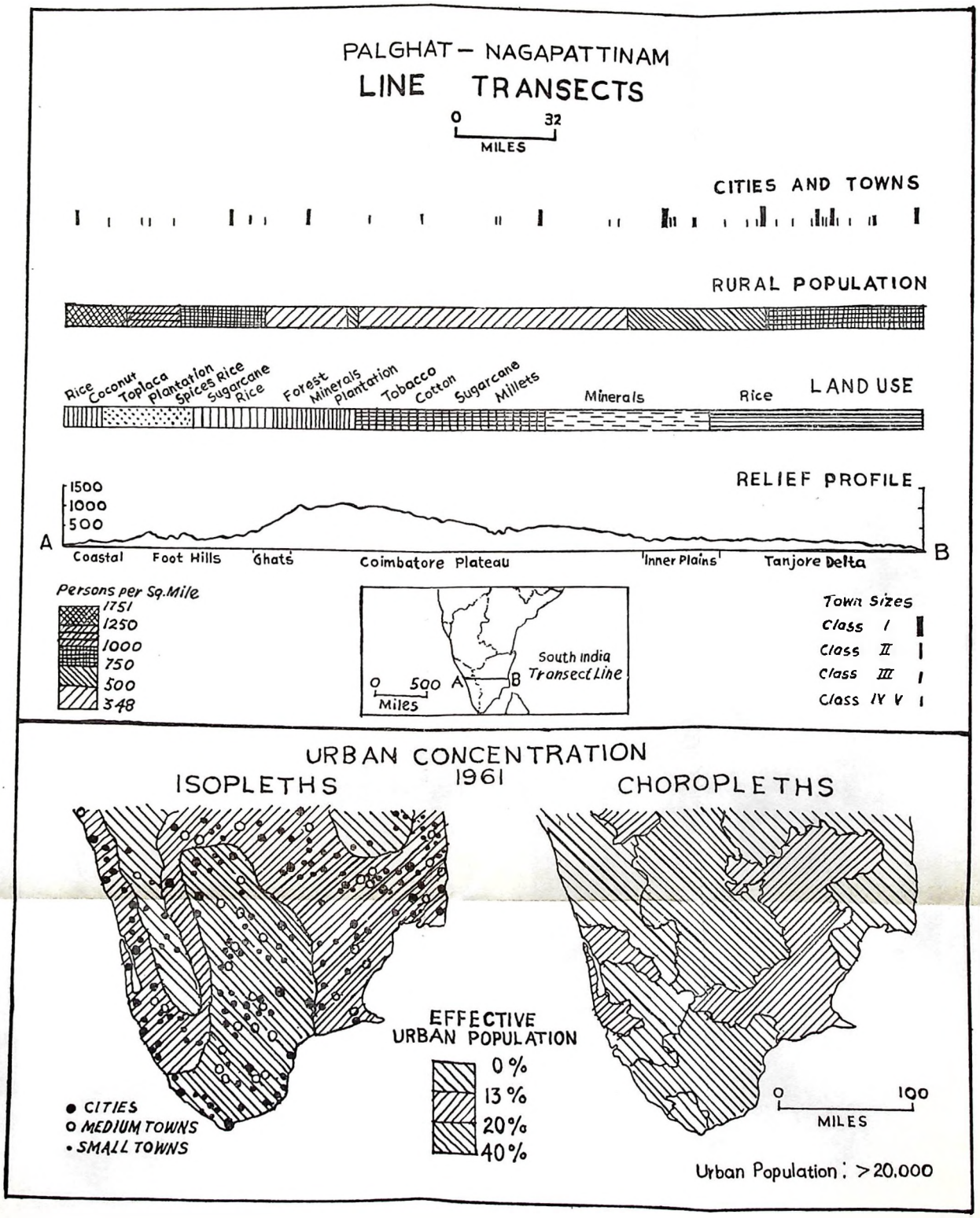
PALGHAT – NAGAPATTINAM
LINE TRANSECTS
0 32
MILES
CITIES AND TOWNS
RURAL POPULATION
LAND USE
Rice
Coconut
Toplaca
Plantation
Spices Rice
Sugarcane
Rice
Forest
Minerals
Plantation
Tobacco
Cotton
Sugarcane
Millets
Minerals
Rice
RELIEF PROFILE
1500
1000
500
A
B
Coastal
Foot Hills
Ghats
Coimbatore Plateau
Inner Plains
Tanjore Delta
Persons per Sq.Mile
1751
1250
1000
750
500
348
South India
Transect Line
0 500
Miles
A
B
Town Sizes
Class I
Class II
Class III
Class IV V
URBAN CONCENTRATION
1961
ISOPLETHS
CHOROPLETHS
EFFECTIVE
URBAN POPULATION
0 %
13 %
20%
40%
● CITIES
o MEDIUM TOWNS
• SMALL TOWNS
0 100
MILES
Urban Population : >20,000

FIG. 6

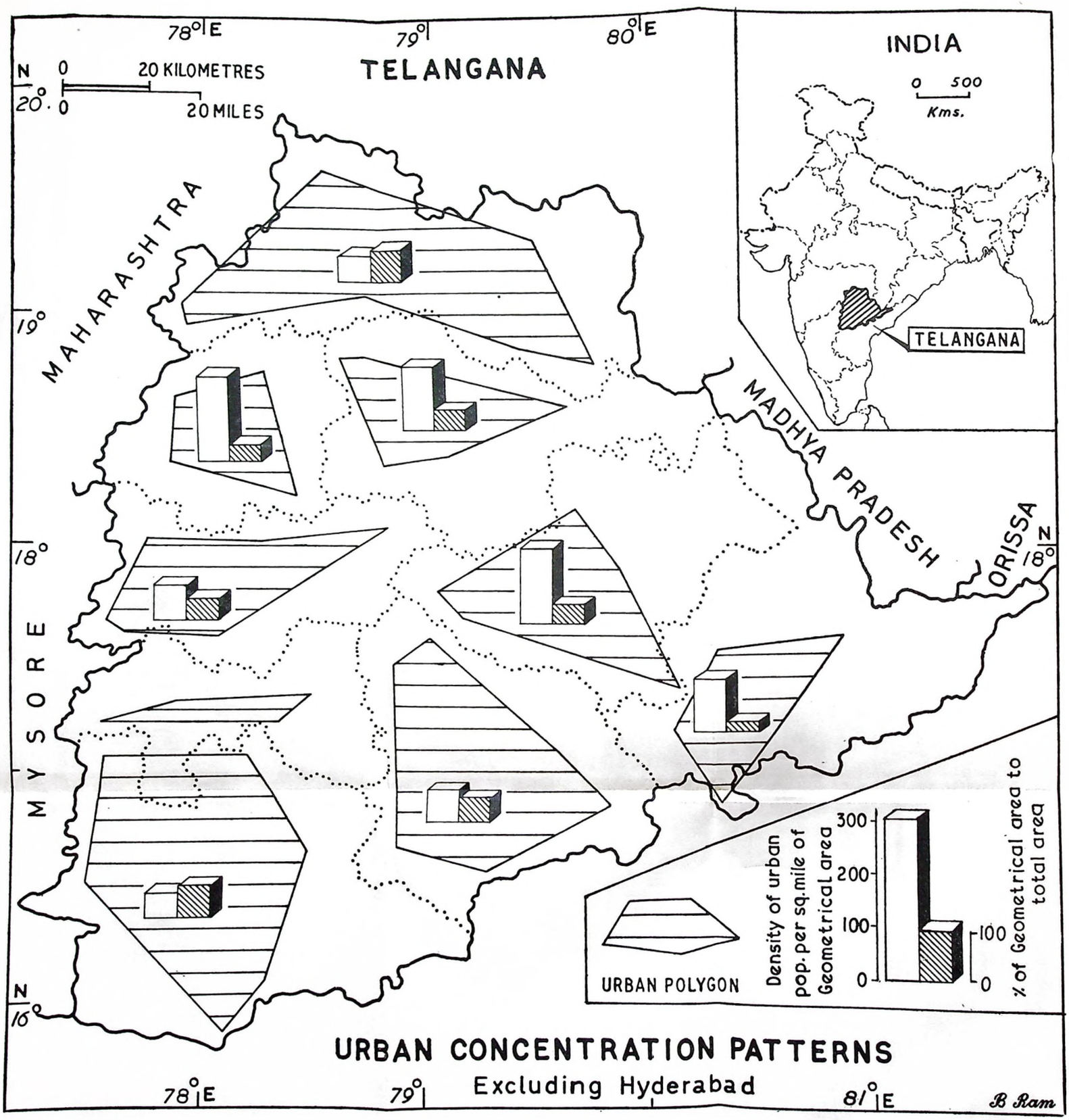
78°E
79°
80°E
TELANGANA
N
0
20 KILOMETRES
20°
0
20 MILES
MAHARASHTRA
19°
MADHYA PRADESH
ORISSA
18°
18°N
MYSORE
INDIA
0 500
Kms.
TELANGANA
URBAN POLYGON
Density of urban pop. per sq.mile of Geometrical area
300
200
100
0
100
0
% of Geometrical area to total area
16°N
URBAN CONCENTRATION PATTERNS
Excluding Hyderabad
78°E
79°
81°E
B Ram

FIG. 7

especially large towns, the greater the urban benefits. A smaller urban geometric area of small towns would naturally mean that there is a large area unserved by towns. The location of the polygon is another factor which can be analysed cartographically. Any measure of urban influence or urbanisation has limitations, and this measure is no exception. The results of this analysis can be tabulated as below:

Urban Concentration in Telangana

District	Proportion of urban geometric area to dist. area (percentage)	Number of towns in the district	Density of urban population per square mile of urban geometric area
Mahbubnagar	52	14	43
Hyderabad	11	4	4,059
Medak	42	8	62
Nizamabad	30	6	161
Adilabad	56	10	45
Karimnagar	26	8	95
Warangal	36	8	123
Khammam	20	5	106
Nalgonda	50	8	54

The Figure 7 bring out these ideas clearly.

Strips/Bands and traffic relief profile

Based on data of movement of goods, people or urban services, flow lines are drawn in proportion to the quantity moved. The direction of movement is shown. The relief profile brings out the existence or absence of nodes, and is used to rank and group the nodal centres. If urban services are represented and their levels ranked, the relief profiles may be used to determine the number of ranks in urban hierarchy. A combination of these two methods (strips/bands and relief profiles) helps in the delimitation of hinter-lands, and in determining the hierarchic levels or the degree of nodality of places (Figure 8).

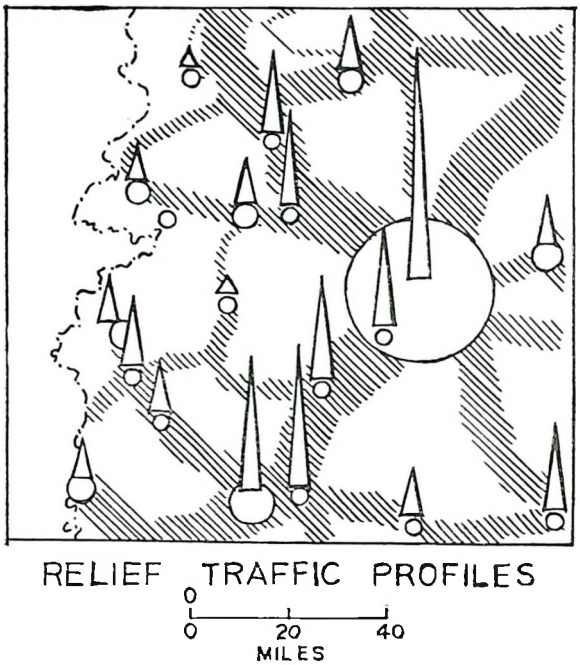

FIG. 8

Econographs

Econograph technique is an improved technique of drawing star-diagrams. The main purpose is to bring out the adequacy or inadequacy of different urban services and amenities with reference to the set of norms or standards. The shape and size of the econograph are important elements. This technique is particularly useful in delimiting contiguous and intensive areas of a given level of urban services and amenities. The different services and amenities have different units of measurements, and there is the need for

conversion into standard units. With a change in the scale of the econograph, its pattern changes, and hence the scale should be common for all towns.

Chorochromatic techniques

Chorochromatic techniques are used to bring out the sharp regional variations and transitional zones, and to portray related distributions in space. The techniques are non quantitative. On small scales, the techniques are employed only for illustrations in atlases and geography text books, while at chorographic and micro scales, the techniques are used to bring out spatial patterns and inter-relationships. The trend today is to incorporate quantitative aspect, through graded symbols and shade and screen intensities. Both overlays and sieve methods are used in extracting the patterns. A chorochromatic map is usually an end product of regional analysis and it represents synthesis in space, highlighting the location, contiguity or scatter, size and shape of the patterns.

Normally pictorial symbols are used to bring out the third (vertical) dimension of the landscape, as in the house types in an urban land use map. Here the map-scale is field scale (four inches or six inches to a mile), usually used in town plans. At the chorographic scale (one million and two million) all related variables whether they belong to points, lines, or areas, are shown to bring out the correlations in space. Unrelated variables are sieved out, and hence, a chorochromatic map is not a 'total map'. Only those variables which help in further elucidation of the patterns are incorporated. To facilitate the use of greater number of variables, colour and black and white screens are used: food crops in colour and cash crops in black line shadings. The map is quantified by showing production per acre in each crop association zone by proportionate circles and the percentage cropped area by graded line or colour intensities. Such a

map is deviation from the orthodox map. Here, of course, there are problems of reproduction, but all maps designed for analysis need not be reproduced. Strictly, there is no scale constraint in the maps under this category, but if these maps are to be used for pattern identification and regional development policy formulation, scale does become a constraint. A map showing the location of large cities with accelerating growth, both in numbers and urban area overlaid on natural land types, watershed zones and area of structural instability and flood hazard certainly provides a base for regional urban planning and policy formulation through regional zoning.

To sum up, what I said in this lecture, it is difficult to standardise cartographic techniques and the two determinants are the map scale and the purpose and the mappable character of the variable. Selection of class intervals and visual comprehension introduce subjective and arbitrary elements in cartographic analysis. The problem is how to minimise these and ensure greater objectivity and precision. Cartographic techniques need to be supplemented by statistical tables and graphs, and cartographic presentation should be distinguished from cartographic analysis.

Conclusion

Now I would like to conclude my two lectures by indicating the main trends and gaps in research in urban geography in India.

(1) Urban geography has not, and perhaps cannot escape 'quantification' and one limitation here is the non availability of data, or where data are available, they are 'low powered'. There is a tendency to 'overdo' in quantification, resulting in a 'game which is not worth the candle'. Research workers are becoming aware of this, and this is a positive sign.

(2) There is a definite shift from systematic urban geography of a single town to regional urban geography oriented

to planning. This is leading to an emphasis on theoretical and empirical work. Here is a major gap.

(3) There is no evidence of any continuing work on the same town or urban region for a period, say at least five years. Time dimension in regional urban research should receive more attention. Case study approach is more rewarding here.

(4) The following fields and sub fields in urban geography are listed and these are only indicative and certainly not exhaustive.

(*a*) Regional Urban system.
(*b*) Transport net-work and urbanization.
(*c*) Urban Form.
(*d*) Consumer travel behavioural patterns.
(*e*) Urban Multiplier.

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