9. URBAN SPHERE OF INFLUENCE OF CALCUTTA: A CASE STUDY

9.1. INTRODUCTION

Larger urban centres act as focal points for settlements (including smaller urban units) of their surrounding areas. Thus people of the countryside are dependent on the city for certain services provided by it. The concept of the urban sphere of influence has been a natural outcome of investigations into the extent of the territory which contains persons who are dependent on the services provided by the urban unit. Different terminology has been developed in this connection and the urban sphere of influence has been variously referred to as urban hinterland, urban field, city region and so on. Distinction has also been made between an urban service area and a metropolitan region. An urban service area is defined as an area which extends as far as it contains a predominance of people who are directly dependent on the services provided by the urban centre, as for example a villager using medical facilities located in the nearest urban centre. A metropolitan region is generally associated with a large city which is surrounded by extensive areas containing people indirectly dependent on it, as for example the retail establishments of a village or a small urban unit may depend on wholesale outlets located in the city. The term 'city region' has been used frequently in studies of urban hinterlands and has been defined as an area around the city over which the city exercises a dominant influence in relation to other neighbouring cities of equal importance (Ramachandran, 1989). Therefore, the concept of city region takes into account the hierarchy of urban centres and delineation of a city region is done by a comparison of cities of same hierarchic level. A city region is also a metropolitan region when the urban centre under consideration belongs to the class of metropolitan cities.

A study of the urban landscape of West Bengal would remain incomplete without an analysis of the sphere of influence of the metropolitan region of Calcutta, the primate city of the state. The metropolitan cities of Calcutta, Bombay and Madras have dominated the
urban scene in India since early 19th century. Delhi which became the national capital in 1911 was soon included within the category. However since independence the dominance of these four cities are being successfully challenged by newer, fast growing cities like Bangalore, Hyderabad and so on. In 1981 the number of million-plus cities in the country increased to 12. The metropolitan region of Calcutta may be delineated with respect to the other million-plus cities of India. Such a delimitation will provide a general idea of the spatial extent for which Calcutta forms a focus and bring out clearly the importance of the city at the national level.

9.2. METHODOLOGY

It is possible to delineate urban hinterlands in a number of ways using a wide range of variables such as transport and communication linkages, commodity flows and so on. However delineation of the sphere of influence of Calcutta by means of a detailed investigation of such variables is beyond the scope of this work and is also not possible within a short time. Therefore, the present analysis employs the gravity model and is based on a comparison of the population of Calcutta and the remaining eleven million-plus cities in the country.

9.2.1. The gravity model

Many of the models used by geographers draw on physical analogies. This is particularly true of the family of gravity models, so called because they are based on Newtonian gravitation theory. Sir Isaac Newton's Law of Universal Gravitation states that two bodies attract each other in proportion to the product of their masses and inversely as the square of their distances apart. This gives the formula

\[ F = \frac{G \cdot M_1 \cdot M_2}{d^{12}} \]
Figure 9.1

METROPOLITAN REGION OF CALCUTTA

- Metropolitan cities
- Boundary of metropolitan region of Calcutta

Map of India showing the metropolitan region of Calcutta with cities such as Delhi, Lucknow, and Calcutta.
where $F$ is the force with which each mass pulls the other, $G$ is the universal constant, the pull of gravity, $M_1$ and $M_2$ are the sizes of the two masses concerned, and $d_{12}$ is the distance between them.

In geographical studies 'force' corresponds to movements between locations and 'mass' is some measure of movement-generating character of a location such as population size. Distance may be measured either in terms of actual distance or in terms of cost, time and so on. The gravitational constant is replaced by a regionally variable multiplier.

One of the most common uses of the gravity model has been to delimit expected influence divides between two competing urban centres. Thus a theoretical breakpoint may be worked out to show where the influence of one town will be replaced by the attraction of another town. Reilly (1929) propounded a 'Law of Retail Gravitation' which states that two cities $i$ and $j$ attract retail trade from any intermediate town or city, in the vicinity of the breakpoint, approximately in direct proportion to the population of the two cities and inversely proportional to the square of the distance from these two cities to the intermediate town.

Converse (1930) restated this hypothesis by the equation

$$ d_{xj} = \frac{d_{ij}}{1 + \sqrt{\frac{P_i}{P_j}}} $$

where $d_{xj}$ is the expected distance of the divide between the two centres;

$d_{ij}$ is the distance between the two cities $i$ and $j$;

$P_i$ is the population of city $i$ and

$P_j$ is the population of city $j$.

If such breakpoints are discerned in all directions from any town or city, its sphere of influence may be shown on a map.

In order to delineate the sphere of influence of Calcutta in the above manner, theoretical breakpoints have been calculated between Calcutta and the remaining million-plus cities, namely, Delhi, Bombay, Madras, Bangalore, Hyderabad, Pune, Nagpur, Ahmedabad, Jaipur,
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Lucknow and Kanpur. The breakpoints thus obtained have been located on a map and joined by straight lines to delineate the zone of influence of Calcutta (Figure 9.1).

9.3. ANALYSIS

A glance at Figure 9.1 reveals that the metropolitan region of Calcutta extends far beyond the boundaries of the state. Towards northwest the divide between Lucknow and Calcutta is located near the town of Buxar at a distance of about 574 km. from the latter city. The divide with Delhi is located very close to that with Lucknow at a distance of about 585 km. from Calcutta. The breakpoint between Kanpur and Calcutta is located near the railway junction of Mughal Sarai at a distance of about 644 km. from Calcutta. The divide with Jaipur is located further to the west, near the urban centre of Banda at a distance of about 871 km. from Calcutta. Towards west the divide with Ahmedabad is found west of the urban centre of Jabalpur at a distance of 886 km. from Calcutta while that with Nagpur is located close to the town of Bilaspur at a distance of 601 km. from Calcutta. Further south the breakpoints with Bombay and Pune are located at distance of 640 km. and 969 km. respectively from Calcutta, the former occurring east of Raipur town while the latter is found near the urban centre of Warora. To the southwest breakpoints with Hyderabad, Bangalore and Madras are found at distances of 550 km. (near the borders of Orissa and Madhya Pradesh, west of the urban centre of Bhawanipatna), 832 km. (near the urban centre of Narsipatnam) and 676 km. (close to the eastern coast of India north of Vishakhapatnam) respectively from Calcutta.

Therefore, the metropolitan region of Calcutta includes, besides the state itself, nearly whole of the states of Bihar and Orissa. In addition, a sizeable portion of eastern Madhya Pradesh and a small part of northeastern Andhra Pradesh also fall within it. Thus regional capitals like Patna (Bihar) Bhubaneswar (Orissa) as well as cities like Gaya, Jamshedpur, Cuttack and Rourkela come under the metropolitan influence of Calcutta. It may be also noticed that the influence of
Calcutta extends nearly as far south as Vishakhapatnam.
To the east and north east of the state there is no need to compute theoretical breakpoints, since there are no cities comparable to Calcutta in importance or population size in the northeastern region. Therefore, this entire region may be considered to be included within the sphere of influence of Calcutta.

9.4. CONCLUSION

Delimitation of the sphere of influence of Calcutta by means of the gravity model thus shows that the zone of influence of Calcutta extends over the entire north-eastern part of the country and also includes most of Bihar and Orissa. Therefore, it is possible to conclude that Calcutta continues to exert the most powerful pull over this part of the country. However, further investigations are necessary to find out whether the expected breakpoints obtained from the gravity model coincide with actual influence divides in terms of functional and other linkages.

REFERENCES


