CHAPTER III

DELINEATION OF THE FRINGE

The process of urbanization expresses itself through a distinct set of land uses and human behaviour. It brings about socio-economic transformation in the surrounding rural areas. Such transformations are not uniform. They exhibit differential radial tendencies measureable in socio-economic and geographical characteristics. This is particularly noticeable between the city and the rural areas surrounding it. The inter-relationships involve rural-urban contacts interaction and cohesion. As a result of this, the city spreads into the rural areas in a variety of ways. The process of urbanization is clearly reflected in the distribution of non-agricultural ratio, population growth rate, population density, literacy and sex ratio.

The delineation of the fringe implies an investigation of the extent of the city's influence and pattern of urban impacts as obtained reflected in some of the noticeable characteristics in the rural areas around Mysore city.
The secondary, village level information collected and the pilot survey conducted in the study area envisages a list of variables most applicable to the delimitation of the fringe. The review of literature in the earlier pages, in detail, exhibits the various criteria by foreign as well as Indian scholars in the delineation of the fringe of different urban centres. However, the criteria suggested and used for the delineation of the urban fringe in the West should not be used blindly. The urban influence of the cities on the surrounding countryside in India and in the West take place in a completely different situation and in quite different ways. Even the criteria for delineation may vary according to functions, size and nature of the surrounding countryside, existing in different cities of different regions.

It is evident from the studies (for example: Nangia, 1972; Lal, 1980; Gowda, 1979) that there are certain common factors which have been emphasised as meaningful indicators of the urban influence on the surrounding countryside. It is worthwhile to list all such determinants and examine their applicability in the present case.

1. Topographical attributes,
2. Land use and land value;
3. Daily commuting population;
4. Travel time;
5. Milk supply zone;
6. Vegetable and fruit supply zone;
7. Public services;
8. Non-agricultural workers;
9. Sex ratio;
10. Population density;
11. Population growth rate;
12. Literacy rate;
13. Distance gradient;
14. Transport services;
15. Telephone exchanges;
16. Brick kilns;
17. Household density; and

To examine their applicability, the variables listed above can be broadly categorised into four groups, based on their degree of importance. They are:

1. Neglected determinants;
2. Determinants of fringe delineation;
3. Determinants of cross examining the demarcated fringe; and
4. Determinants to be tested in an empirical study.

**NEGLECTED VARIABLES**

The researcher has considered certain variables which were tested earlier by other scholars as inappropriate for the present situation, unsuitable and misleading in the practical delineation of the fringe for the present study area.
Milk Supply Zone

In the earlier studies, milk supply zone has been considered as one of the determinants of the rural-urban interaction. The present situation in the study area exhibits this as a vague concept because the supply of milk to the city exceeds beyond 50 km of radius. The supply of milk from the surrounding villages has been extended for more than 50 km. The Karnataka Milk Federation vehicles collect milk from villages, falling under various administrative units and supply to various towns within the state as well as to the other states, where deficit of milk is found.

Vegetable and Fruit Supply Zone

Keeping this in view as one of the important variables for delineating the fringe, the scholar has personally contacted the officials of the Retail Marketing Centre (run by the Government of Karnataka, where the villagers sell their products such as vegetables and food grains) and collected the data on the daily supply of vegetables from different places. Data show that 12 per cent of the supply of vegetables and fruits come from surrounding villages, 74 per cent from Nagamangala taluk, situated 60 to 80 km away from Mysore City and the rest of 14 per cent of the supply from other states, especially from Tamil Nadu. Hence, this variable is neglected.
**FREQUENCY OF DAILY NEWSPAPER CIRCULATION**

In personal discussion held with some of the local Newspaper editors such as those of Mysooru Mitra, Andolana and Star of Mysore, it transpired that there was no relationship between the frequency of circulation and distance decay. Many villages in Kollegal taluk, Chamarajanagara taluk and Nanjangud taluk (situated more than 50 km from Mysore City) show up higher frequency of newspaper circulation, than those of the villages surrounding Mysore taluk. There are no regular, annual subscribers to the newspapers in many of the villages. Agents of each town distribute the paper to local shops and the papers not sold are taken back. The number of newspapers sold on any given day varies.

**DAILY COMMUTER POPULATION**

Although this variable was considered under the neglected variables, indirectly, due importance was given by demarcating the study area on the basis of the daily commuting zone (that is, villages with direct bus services from the City Central Bus Station) from where the villagers commute to the city on a diurnal basis. Since more than 95 per cent of villages lack private transport, the K.S.R.T.C. is the only means of public transport to these villages. The details of population commuting daily is discussed in Chapter V.
Kapila flow towards the north, northeast and south, respectively, the City is located in a rim-land, from where the land slopes towards the courses. Detailed notes on the physiographical features have already been provided in Chapter II.

**DETERMINANTS OF FRINGE DEMARCATION**

The basic criteria for delimiting the fringe region are the land use influxes, mixed rural-urban functions, interactions within the main city, levels of socio-economic development, availability of urban amenities and proportion of non-agricultural population. It is primarily towards measuring the degree of influence in these aspects that the most significant variables have been chosen, which could reflect the dual characteristics, as tested by Nangia, Lal, Thakur, Bore Gowda and Singh earlier. Those variables are:

1. Distance;
2. Non-agricultural workers ratio;
3. Transport;
4. Population growth rate;
5. Population density;
6. Literacy rate; and
7. Sex ratio.
Method of Delimitation

Different methods were applied in the delimitation of the area of city’s influence. Several scholars have applied statistical methods such as the simple mean and variance to correlation, regression and coefficient of determination, test of significance and other methods, but the present delineation of fringe has been done using simple statistical tools (Phadke and Sita, 1981), which could establish facts clearly and precisely without ambiguity. As stated in the previous chapter, the delimitation of the study area for analytical purposes has been quite accidentally developed into a primary delimitation. It includes the daily commuter zone as well. In all respects, it is different from the complete rural settlements (settlements located farthest from the sphere of the city’s influence).

In order to determine the degree of urbanization within the delimited fringe boundary, two steps have been adopted for further demarcation of the Inner City fringe, urban fringe and rural fringe. As the first step, urban and rural averages have been taken into account at the National, State and at District levels. The additions of the averages at three levels, both for rural and urban areas sets the demarcation limit as stated through the formula below:

\[ U_d = U_{an} + U_{as} + U_{ad} + 1/n = \text{Urban Limit} \]
\[ R_d = R_{an} + R_{as} + R_{ad} + 1/n = \text{Rural Limit} \]
where

\[ U_d \] stands for urban limit;
\[ U_{an} \] for National urban average;
\[ U_{as} \] for State urban average;
\[ U_{ad} \] for District urban average; and
\[ n \] the number of variables.

The mean, thus obtained from the urban averages, sets the urban limit, highlighting those villages which cross this limit with respect to the non-agricultural workers ratio, population growth rate, population density, literacy rate and sex ratio as high ranking villages set the Inner City Fringe. The villages falling under the category of more than rural mean but less than urban mean are medium ranking and thus is called the 'Urban Fringe'. The rest of the villages, excluding the uninhabited, which have lower than the rural average, is termed as the 'Rural Fringe'. At the second step, the villages thus categorised as high, medium and low with respect to the different variables mentioned earlier, are rated with values of 6, 4 and 2, respectively. An aggregate score (from the addition of ratings) for these 7 variables (that is, at a maximum of \( 6 \times 7 = 42 \) or a minimum of \( 6 \times 2 = 12 \)) have been added to the ratings for distance and transport to determine the level of urbanization.

Only those villages which have an aggregate value greater than 80 per cent of the aggregate score has been designated as the 'Inner City Fringe', more than 60 per cent and less than 80 per cent as the 'Urban
Fringe’, more than 40 per cent and less than 60 per cent of aggregate scores as the 'Rural Fringe'.

**DISTANCE GRADIENT**

Distance has an important bearing on the settlement structure of a city region. It not only determines the centripetal pull of a city but also the degree of its interaction with the city region. The assumption underlying the selection of this variable is that it attributes the pattern of transformation around the city in a logical sequence to the increase in distance from the city.

The application of the gradient analysis is limited mainly to the intra-city analysis (Nangia, 1972). Singh (1966) has calculated density gradients for the Indian cities, starting from the nodal points of a city to a distance of 5 miles.

Keeping the attributes above in view, the study area has been divided into three zones (Figure 3.1) at an interval of 10 km of radius from the city centre. The first concentric circle comprises of 76 villages, excluding the city limit, accounting for 22.8 per cent. The second zone accounts for 42.4 per cent comprising of 141 villages and 115 villages fall under the third zone accounting for 34.6 per cent. It is understood from the pilot study that the villages away at 20 km of radius have more interactions through buses.
and bicycles. Therefore the villages falling within 20 km from the city centre have been considered as falling within the fringe boundary.

**RATIO OF NON-AGRICULTURAL WORKERS**

The impact of urbanization on the villages surrounding the city has been markedly discernable in their occupational structure more so than in any others. A high ratio of non-agricultural workers, in fact, is a good measure of the zone of urban influence. This category includes workers engaged in household industries, manufacturing industries, construction, trade and commerce, transport, storage, communication and other services. The very secondary and tertiary occupations are the true characteristics of the urban landscape. The village people engaged in these activities are classed as rural although they are not engaged in farming.

In the delineation of the fringe, non-agricultural workers have been given due importance by a majority of the studies, including those of Rodehaver (1947), Gowda (1979), Hiralal (1972), U. Singh (1966), the U.S. Bureau of Census (1972) and National Geographic Committee of Remagon, Germany (1940).

The demarcation of the fringe belts on the basis of non-agricultural labour ratios have been blended with the general\(^1\), urban non-agricultural workers’ ratio and the Census of India\(^2\) definition in categorising a
settlement as a town. The general urban and rural average measures 87.9 per cent and 22.5 per cent, respectively. Those villages accounting for more than the general rural average and less than the urban average have been designated as those forming the fringe boundary. This category of villages accounted for 29.8 per cent to the total number of settlements and 5.4 per cent of the settlements possess more than 87.9 per cent of non-agricultural labour ratio. Another 48.8 per cent of the settlements has rates below the general rural limit. The pattern emerging in the distribution of non-agricultural labour ratio envisages clearly that the non-agricultural activities are remarkably concentrated along the main axis of routes of the transport and manifest distance decay. For further observation, the villages designated as those belonging to the fringe have been put to secondary break-up, activating the census definition into operation. Of the total 332 settlements, 99 designated fringe villages stood above 75 per cent mark, reinforcing the urban influence along the axial routes and nearest neighbour effect.

TRANSPORT

Transport availability or accessibility is an important factor in determining the impact of the city over the villages surrounding it. Among the various means of transport, road transport is the main artery linking the rural and urban societies. In this context, transport facility is treated as one of the significant variables in determining the fringe boundary. Transport
services decline in frequency with the increase in distance and this results in low interactions, as well.

In the study area, about 95 per cent of the villages depends inevitably on the Karnataka State Road Transport Corporation's (KSRTC) suburban services. The suburban buses ply from city bus station to the surrounding villages at different time intervals and along different routes.

To demarcate the fringe boundary, the frequency of the bus trips have also been considered. For a moderate level of interaction between places, 5 trips a day at different time intervals are essential and as recommended by Chatterjee (1974). As such, those villages which command more than 5 trips and less than 10 trips a day as a zone of urban interaction. Nearly 27.4 per cent of the villages are served by more than 5 trips a day and about 19.6 per cent of the settlements enjoy high frequencies of bus services and about 53 per cent of the settlements are to contented with a low frequency of services.

With the frequency of transport, the Nanjangud sector, K.R. Nagar sector, Bangalore sector, (that is, towards the south, southeast and northern part of villages) enjoy better services giving impetus to the general outline of fringe in this direction.
POPULATION GROWTH RATE

Growing concentration of population is one of the important measures of urbanization. Reciprocal to the concept, the growth of population in the rural-urban fringe of Mysore city has experienced phenomenal growth from 1961 to 1991. The mean growth rate of urban population in 1981-91 was 33 per cent. The villages with growth rates equal to or more than this average has been considered to delineate the inner boundary of the fringe. Similarly, the mean rural growth rate was 18.9 per cent. Those villages which have experienced growth rate more than this average are considered as those within the fringe.

Of the total number of villages, 28 per cent of the settlements have registered more than the urban average in 1991, and 30.4 per cent of settlements could be termed the urban fringe and 24.2 per cent as the rural fringe. In comparison to the growth rate of 1991, 18.6 per cent of settlements have registered more than the urban average, 22.9 per cent of settlements as urban fringe and 31.6 per cent as the rural fringe during 1961-71.

POPULATION DENSITY

It is a fairly good index of the influence of the city. De-ruralization of the small and distant villages and urbanization in the fringe villages are
particularly noticeable in the form of relative higher density of population in the urban fringe. Besides, the urban areas are growing more rapidly than the rural areas in population because of population movements from rural exodus. The movement appears to be larger in number because of rural under- and un-employment and the consequence search for urban employment.

The centrifugal force operating in the city also compel people and functions to out-migrate to the fringe. The rural Immigrants do not get cheaper houses in the town and as such they prefer to settle down in the fringe. This makes the density of the transitional zone higher than the that of the rural areas, but lower than that prevalent in the city. The calculated urban density of the city of Mysore was 4,628 persons, whereas the rural average has stood at 186 persons per sq. km. in 1991 census, demarcating thus the fringe villages. Of the total of 332 villages, the fringe villages accounted for 56.6 per cent and the inner zone or the villages above the urban average density accounted for 2.4 per cent and the rural fringe accounted for 30.4 per cent. As a consequence, the density patterns provide for one of the working measures for the delineation of the fringe.

LITERACY

Urban centres are the focal points of learning. Mysore city is no exception. It has been a seat of learning from time immemorial and is still a significant centre of education in South Karnataka and one of the
important educational centres of South India. Naturally, the villages in the vicinity of the city must have a higher proportion of literacy than their rural counterparts. The literacy rate of Mysore city was 60.2 per cent as against 28.9 per cent in the study area. The average urban literacy rate has stood as high as 73.9 per cent and the average rural literacy at 43.0 per cent. In the study area, 2.1 per cent of settlements crossed the urban limit, followed by medium literate villages (that is, between high and low literacy rates) which accounted for 15.4 per cent and low literacy villages accounting for 71.4 per cent. There is a clear concentration of medium level of literacy in the villages around Mysore city, indicating the zone of influence. The northern part of the study area comprises of a good number of villages with literacy above the general rural average. Towards the western flank, the axial route has played a significant role in the education of the villagers of that region.

SEX RATIO

Generally, most urban areas have lower sex ratios (more males than females). It is because more males than females migrate to the town or city for employment and education. The sex ratio in the fringe, as such, is also transitional. Fringe is also characterised by certain groups of young people: generally in the early years of their married lives, starting up their homes. Some of the families living in the urban areas and in the fringe do not bring their girls or women, particularly when they have only limited space in
their accommodations. This results in an unequal sex ratio. A majority of
the houses in the fringe is partially built land lack vital amenities. The
house owners, therefore, prefer unmarried people or couples without
children or students who are willing to pay a handsome rent paying capacity
and may dispense with limited amenities provided. The rural-urban fringe
of Mysore nearly substantiates this characteristic features.

In the demarcation of the rural-urban fringe, the average urban and
rural sex ratio have been considered. The average urban sex ratio of 1991
obtained was 922 females for every 1000 males and the rural sex ratio was
956. In the study area, 25.9 per cent of settlements registered lower sex
ratios than the average urban sex ratio, forming urban characteristic
regions. Another 25.6 per cent of villages recorded sex ratios more than
the urban average and less than rural average, establishing the fringe
boundary while 37.0 per cent of villages have shown greater than the rural
average.

**Final Demarcation**

The scores for the 332 villages in the study area has been arranged
in an ascending order to establish the percentum score for individual
villages. The villages have been categorised into four classes of
urbanization such as more than 80 per cent to the total score as Inner City
Fringe, less than 80 per cent and more than 60 per cent as urban fringe,
below 60 per cent and more than 40 per cent of score as the rural fringe. The villages with less than 40 per cent of the scores are designated as typically rural.

No settlement registered the total score 42 (7 variables x 6 = 42) reflecting that, they are yet under the processes of acquiring city characteristics. Including the urban agglomeration, 7.2 per cent of the settlements has secured more than 33.6 points, indicating 80 per cent of urbanization and they have designated as forming the Inner City fringe. The urban fringe exists next to the Inner City fringe stretching mainly along the axial routes and thus it is remarkably elongated towards the south and southeast (Figure 3.4) accounting for 28.3 per cent of total settlements, possessing a score of more than 25.2 points. The rural fringe encloses the urban fringe without no pockets of intrusion, accounting for 42.5 per cent of the total settlements with scores not exceeding 16.8 points. The remaining 22.0 per cent of the settlements are categorised as those with rural characteristics.

RURAL - URBAN FRINGE OF 1971

During this period, the inner city fringe did not exist except for a settlement showing more than 80 per cent of the scores. Then, the urban fringe has developed enveloping the city. However, the city exercised its influence over a small area of villages lying immediate to the city limits and
the most easily accessible villages located along the main road. The rural-urban fringe has set its boundary 5 km from the city centre. Another remarkable feature is that out of the 33 urban fringe villages, only 5 villages existed with the semi-urban character, delinked from their counterpart and away from the city. Though these villages were located in rural fringe, it existed along the main road, but not as a continuous chain (Figure 3.2).

About 146 villages possessed more of rural character, falling in what could be called the rural fringe. The rural fringe existed around the urban fringe settlements, with 4 or 5 settlements trespassing the urban fringe boundary. There was a great influx of people and materials at the boundary of the rural fringe since its boundary has been deeply penetrated by the rural settlements mainly in the west and southwest. In the east, northeast and southeast, the settlements bordered the outer limit without any intrusion in the rural fringe boundary.

**RURAL - URBAN FRINGE OF 1981**

The fringe development during 1981 had taken a clear shape, indicating the zone of higher interaction and influence of the city. The fringe was elongated along the transport routes of Bangalore, Nanjangud, Hunsur and T. Narasipur, stretching to a distance of 23 km in the south, 20 km in the east, 10 km in the north and northeast (Figure 3.3).
The inner city fringe settlements were 16 in number, mainly bordering the city limits. The inner city fringe’s existence was found within a radius of 10 km from the city centre. The alignment of fringe settlements was very impressive in contrast to 1971. During 1981, there was not much intrusion from the urban fringe settlements over the inner city fringe boundary or rural fringe settlements over the urban fringe settlements. It can be said that the distance from the city had a vital role in the development of the fringes.

**RURAL - URBAN FRINGE OF 1991**

The process of transformation of rural settlements into semi-urban character over time and space has been clearly visible in the delineated fringe of 1991. The variation in the number of settlements in the inner city fringe, between 1971 and 1991, has been of the order of 25, indicating a high order of influence of the city in a short span of 20 years. In the case of urban fringe, the percentage variation has risen from a total of 33 settlements in 1971 to 93 settlements in 1991. There is a decline in the number of settlements in the rural fringe, from 146 in 1971 to 141 in 1991. Similarly, the rural settlements too have experienced the negative growth of -52.2 percent indicating the normal tendency in the development of fringe (Figure 3.4).
SHAPE AND SIZE OF FRINGE

The decennial expansion of the fringe has developed in the same direction as it was during 1971. The urban fringe has stretched deeply towards the southern, southeasteren, northeastern and northern directions covering a total geographical area of 47,582.35 ha whereas the rural fringe has encroached 61,449.77 ha of geographical area towards the north and northeast and the adjoining settlements of the outskirts of the city.

The sector-wise expansion of the fringe limits indicates that the process of interaction and transformation have not been uniform in all sectors. The inner city fringe development and the Concrete expansion of the city have been towards the Bangalore and Hunsur sectors, whereas the urban fringe expansion has been towards the Nanjangud sector.

EXAMINATION OF DEMARCATED FRINGE

The demarcated fringe has been further examined to confirm whether or not the fringe boundary is nearer to the true boundary. The demarcated fringe is thus tested by a different methodology with the application of Boundary-Girdle method and the Score Analysis Test.
BOUNDARY-GIRDLE METHOD

The idea of superimposition of maps to identify the Boundary-Girdle was initiated by Otto Maull (1915) who used it for the delimitation of regional boundaries in the Balkans. This technique of delineating a region has been used here for two reasons: first, its simplicity and the approximation it makes for in the relationship among the variables. This technique has been applied to Indian cities in the demarcation of fringes by many Indian scholars. Singh (1964), using only a few variables, delineated the urban area of Bangalore. Learmonth, Bhat and Rao (1961) divided Mysore State (the older name for Karnataka State) into planning regions, while Alam (1972) demarcated the planning areas of Hyderabad. Bore Gowda (1977) has delineated Bangalore city fringe adopting cartographic and correlation techniques.

In all these studies, the delimitation of the boundary of concerned study area has adopted a median line from the superimposed boundaries. A common assumption underlying all these studies is that the various structural characteristics used are interdependent and as such cannot be treated in isolation. Thus, the region of fringe of a town or a city depends upon the composite framework of all the selected variables.

The fringe demarcation tested by Arun Das (1995) through Boundary-Girdle method has been purely on the basis of cartographic techniques and
the mean variation between the rural and urban with respect to the following variables:

1. Distance from the city;
2. Frequency of Transportation;
3. Non-Agricultural workers ratio;
4. Population Growth rate;
5. Population Density;
6. Literacy rate and
7. Sex ratio.

These determinants when shown on the map and superimposed (Figure 3.5) have provided satisfactory results. There is a zone in which most variables co-exist in space and at the same time. There is also a zone where a very few are conspicuous by their presence.

The fringe demarcated through the score analysis coincides exactly with the Boundary-Girdle method. The few variables of population density and sex ratio reshape the Girdle-Bunch in the southwest direction, elongating the fringe boundary. Except this variation, the rest of the Girdle Bunch has set its path almost matching with the boundary demarcated by score analysis.
Notes

1. The words 'general average' refers in this study to mean obtained from the National Urban Average, Karnataka State Urban Average, Mysore District Urban Average and the Mysore City Urban Average.

2. To classify a settlement as a town, the Census of India has prescribed 75 per cent of non-agricultural work force to the total main workers of the settlement as one of the basic criteria.

3. A trip of the bus refers to 'return travel' between the origin and the destination.