CHAPTER - II

REVIEW OF LITERATURE

2.1 Introduction

This chapter deals with the review of literature. The review is on different aspects of rural urban fringe such as identification of fringe, its linkage, characteristics, and regarding the future planning of fringe. The review of literature through GIS and remote sensing has also been carried out. It is done by taking into consideration the growth, impacts, planning and management of the fringe. The review of literature has also facilitated the identification of research problem and the formulation of the objectives and methodology of the study.

- Identification of the Fringe.
- Linkage.
- Characteristic Features (Socio-Economic and Demographic).
- Fringe and Future Planning.

2.1.1 Identification of the fringe

From the literature survey conducted on present theme of research, it is found that geographers have not paid due attention towards the villages which have been forced to surrender land to the expanding cities and also bring change in their socio-economic and demographic characters. Many scholars have explained the case of urban expansion in general and in developing countries of the world in particular. The peripheral area of the cities conforming to rural urban fringe received little attention from (1923) when Burgess
put forward his classical model of concentric zone around cities. Although, the zones of Burgess’s study was only incidental as far as the fringe zone was concerned. The fringe zone was not designed separately. The term urban fringe was first used by T. L. Smith (1937), to describe the built-up area just outside the corporation limits of the city.

To analyze the “elements of urban fringe pattern”, Andrews (1942), in his study of, has tried to distinguish between the urban fringe and rural urban fringe. The rural fringe according to him refers to the actively expanding sector of compactly build economic city, while rural urban fringe refers to the area adjacent to the periphery of urban fringe. He attempted to identify land use characteristics of fringe zone. He defined, “the adjacent peripheral zone of the urban fringe….as the area of intermingling zone of characteristically agricultural and characteristically urban land use structure obtained in the area”. In the same year, Wehrwein (1942) has studied the problems and prospects of the fringe. He called the fringe in the USA as ‘Institutional Desert’ because of uncontrolled location, unpleasant and noxious establishment occur in the fringe zone. He called the fringe zone as the area of mixed land use both farm and non-farm uses. He concludes that the fringe area can be bitterly understood and identified in terms of land use pattern than in any other way.

Harris (1943) has used the new term to suburbs as “climax area”. The expansion of the area depends upon the physical features of the periphery and the size and function of the urban centre. Garnier and Chabot (1967) have tried to identify the suburbs on the basis of built-up area. It starts from that area where from the continuous built-up town ends. As he defined “first there is a built-up area of the houses with small gardens, forming dormitory, communities from which more than half the active population work
in town”. Wissink (1962), in his extensive survey of the fringe area of American Cities identified “fringe”, “suburbs”, “pseudo-suburbs”, “satellite” and “pseudo-satellite”. He called it an area of “great differentiation” in land use terms.

To analyze the different activities of the fringe area, Whitehand (1967) divided the rural urban fringe into three zones, Inner Fringe Belt (IFB), Middle Fringe Belt (MFB) and Outer Fringe Belt (OFB). He suggests that inner fringe belt surrounds the Central Business District (CBD) and urban activities dominate in this area. The adjacent built-up area is known as Middle Fringe Belt; both agricultural as well as urban activities are found in this zone. While countryside villages with agricultural land would be Outer Fringe Belt. In the same year Pastalan (1967) gave an operational definition of the fringe as an area of transition between rural land use and giving way to urban land use. Oosthwizen (1969), in his study of rural urban fringe, he has given alternative terminology of the sub-urban area, as ‘rural suburbs’ and quasi-urban area or quasi-urban township. The term quasi urban or urban township means those population clusters like villages or sparsely populated residential area without any recognized form or urban authority situated away from the metropolitan area and identified by place name.

On the basis of land use composition and data related to census, Pryor (1969), according to his view the rural urban fringe may be quantitatively divided into urban fringe and rural fringe on the basis of land use composition and data related to census. He has taken arbitrarily the distance of 5 miles from Central Business District (CBD) for the demarcation of urban fringe. The urban fringe exhibits a density of occupied dwelling higher than the average density of the rural urban fringe and a higher rate of increase in
population density, land use conversion and commuting by contrast, the rural urban fringe exhibits a lower density and lower rate of increase.

The extension of the town or city area does not only effect the town or city itself but also the surrounding area also, in this context Rajbala (1985), in his paper of, “Extension of Town Boundary in India and its Implication” he opined that urbanization leads to the extension of town boundary, which effects the social, political, and economic life of the people residing around the town, land value also gets effected.

Another work regarding this category has put forward by Ewing (1997), in his study of ‘Is Loss Angles-Style Sprawl Desirable’ has identified the three basic characters of sprawl:

1. Leapfrog or scattered development
2. Commercial strips development and
3. Large expansion of low density or single use development – as well as by many indicators as low accessibility and lack of functional open space.

2.1.2 Linkage

Urban geographers are of the opinion that there exist a close relationship between the city and the surrounding area in terms of social, cultural, economic, and administrative functions. To identify the functional linkage of the region different terminology was used from time to time. In order to represent the city region relationship, Allix (1922) was the first to use the term ‘Umland’ to express the concept of economic domain of an interior city as distinct from the hinterland of the port city.

To analyze the importance of the countryside in the city growth Jefferson (1931) identified that countryside help the city in its growth. Cities do not grow of themselves
but it is the countryside which sets them to do task which must be performed by them. Vancleef (1941) used the term independently as he divided the economic domain into two parts:

1. Placing in the umland those that behave economically as though they were located within the political limits of the primary centre and

2. Including in the hinterland those communities whose most, but not all, economic activities are focused on the primary centers.

Greater the nearness to the town or city of a village greater be its impacts in this manner Fiery Walter (1946) has considered accessibility as the basic factor responsible for the fringe development. He opined that “the rurban fringe is an marginal land use area not because of its geographical location, its soil type or its topography but rather because of its particular degree of accessibility (relative to that of other land use) to some central transportation point”.

It has been analyzed by geographers that the study of city or town is incomplete without their regional relationship. It is because both the city and town grow in relation to each other in this respect Smailes (1947), conclude that the towns do not exist in vacuum, cut from the continuous area along clear cut boundary line; on the contrary they are always related to the bigger towns or cities than themselves. The towns do not grow separately; there is no clear cut boundary in between them. On the contrary they grow in relation with each other. Small towns are related with bigger towns, and bigger towns are closely linked with the city and so on. Dickinson (1947), while elaborating the city region concept, he opined that an urban center, on the one hand, serves the group of villages and
towns surrounding it, while on the other hand, it is itself served by them. The entire area therefore represents a close association with each other.

It has been analyzed by different geographers that city and its surrounding area grow in connection with each other in this context, Balk (1957), laid emphasis on the accessibility as a sole factor in the development of fringe. He added new terminology as he found the fringe an area of ‘rurbanisation’. Sinclair (1967), has discussed the impact of urban growth on rural areas. The urban encroachment on the rural land is directly proportional to the growth of urban area i.e., higher the growth of urban area greater will be the urban encroachment on rural areas.

The villages does not abruptly gets converted into urban area but it a stage wise process, in this matter Srivastav & Ramacharadran, (1974), had proved those factors which are heterogeneous in nature, responsible for the formation of present fringe of Delhi and had worked out a stage model indicating the various stages of the growth of villages around a metropolitan.

1. The rural Stage.
2. The stage of agricultural land use change.
3. The stage of occupational change.
4. The stage of urban land use and
5. The urban village stage.

Another work, limited to single city region is on Delhi metropolitan region by Nangia (1976), while studying the influence of Delhi metropolitan she has taken tentatively an area within a radius of 40 kilometers and found the distance has great
influence on the settlement structure and the various socio-economic and demographic variables by existing both positive and negative relationship.

In an another study on Bangalore city region by Prakasarao and Tewari (1979), emphasis the role of Distance-Decay effect in various variables from to hinterland is responsible for the formation of distance zonal structure of the city region. The urban growth has also its impact on occupational structure of the people of the surrounding areas in this connection an interesting work done by Swaminathan (1980), had studied the occupational structure of small town Tanjavur district, and gives importance to a small town in maintaining the connection between rural population and urban centre. He opined that, “the theoretical importance of small towns is that they provide a vital connection between dispersed rural population and medium and large urban centers. The small towns connect surrounding population by providing goods and services. The small towns form a major component in the National settlement System”.

Another work carried out in this aspect by Phadke and Sita (1981), have studied the spatial pattern of urban influence of Bombay. They conclude that it is accessibility rather than geographical distance as a major factor responsible for spread of urban attributes. It has been argued that towns cannot grow as isolated pockets without maintaining functional linkage with rural hinterland, Das (1985), in his study of rural urban fringe interaction in Orissa; he laid much emphasis on centrifugal forces of development. In case of its failure to the periphery leads to create the spatial disparity.

The extension of the fringe depends on the growth of the town or city, Bunker and Holloway (2001), in his study on rural-urban fringe of Sydney, have noticed that rural urban fringe has been pushed outward as the capital cities have grown strongly. Typically
the inner boundary of the rural urban fringe is seem as the moving suburban frontier and the outer boundary determined in terms of some level of accessibility to the metropolis. This is defined by the extent of the commuting to the metropolitan labor market by the work force living in the fringe.

2.1.3 Characteristic Features (Socio-Economic and Demographic).

The delimitation of the city and its complementary region has subsequently been an important theme in the urban geography investigations. The methods and approaches of the delineation of rural urban fringe in various studies is primarily based on parameters relating to different economic, social, demographic, cultural, and land use pattern characters. In order to identify the extent of fringe, Alpake (1942), in his study of ‘Land Use Control in the Urban Fringe of Portland Oregon’, he analyzed that urban fringe is that zone where the cultural development takes place outside the boundary of central cities and extend to the areas of predominantly agricultural activities. To highlighted the agricultural characters of the fringe Wills (1945), in his study of ‘the rural urban fringe of Sydney’, has taken into consideration its inner and outer components and commented on its dynamic nature as the “the build-up area advances unevenly into its surrounding countryside and the rural-urban fringe is pushed before it on to new areas”.

Mayer and Beegle (1947), in their study of Metropolitan Region of Detroit, they distinguish the fringe township into ‘true fringe’ and ‘partial fringe’. They have applied the proportionate size of the Non-village, Rural Non-Farm (NV-RNF), and population with respect to the total population of the fringe. Townships with 50 per cent or more NV-RNF population occurring in an essentially contiguous area outside the city as the
true fringe, whereas townships with the ratio of 25-50 percent normally further from the city, called as partial fringe.

The city region differs in extant, structure and intensity, all being in turn related to the population size, functional scale and the city’s situation as a regional centre. Thus, the criteria used for this purpose are found to be different as they have been selected according to the specific situation. Green (1950) delimited the urban hinterland in England and Wales on the basis of bus service. He observed that different hinterlands could not coincide such as; commercial, industrial, professional and administrative. Singh (1955) has studied about the rural urban fringe of Varanasi, and called it an extension of the city itself, actual and potential. He tried to identify that fringe area is dependent upon the urban centers for some of the urban facilities.

Duncan and Reiss (1956), in their extensive survey of Chicago fringe, they have made distinguish between urban fringe, rural non-farm and rural farm within the Chicago city. According to him urban area contains three components as Central city, Suburbs and Urban fringe. The outer limit of the urban area i.e., urban fringe is limited to the corporate limit of the city and often it crosses the limit also.

Martin (1957), has studied the Satellite Rural Areas of USA has conclude that there is an upward gradient from rural to urban areas; and this can be related both to exurban invasion, and the occupation and income characteristics of the fringe; the residents in the fringe exhibits a lower educational level, by various measures than residents of urban places itself, but higher than surrounding rural areas. On the basis of its characters Conzen (1960), he divided the fringe into two sections and has considered the fringe belt as a determinant of the morphology of urban settlement.
1. The ‘Proximal’ or inner margin where development is closer and more continuous and

2. The ‘Destal’ or the outer margin where growth is more sporadic and development is dispersed.

In order to assess the factors of the fringe Pryor (1968) laid emphasis on the following characteristics as tool for delineation of rural urban fringe, as:

1. The incomplete network of utility service

2. An adequate network of public transport

3. A relatively high car ownership ratio and

4. Accessibility to place of work and

5. Accessibility to retail centers.

In the same year U. Singh (1968) Studied the rural urban fringe of KAWAL town and conclude that the fringe area coalesced together inheriting all the evils if large conurbations such as horrible slums, appalling houses and traffic congestion and long daily trip to work.

Golledge (1960) in his study of Sydney’s suburban have demarcated that suburban have some major character tics:

1. Consistently changing land use pattern.

2. Small farms.

3. Intensive crop production.

4. Mobile and low and moderately dense services and public utility.

5. Rapid residential expansion and

Different scholars have studied the delimitation of the rural urban fringe for a number of cities, for understanding its structure and form and to provide a base for formulating the rural urban fringe development strategies. Ellefson (1962), attempted to delaminate the zone of influence of five Metropolis of India viz. Bombay, Delhi, Madras, Hyderabad and Baroda. He has taken population density and commercial population into consideration and concludes that distance-decay has a great impact on city’s influence. In the same year Hind Smith (1962), while studying Ontario fringe of London, he identified the fringe by means of four indices:

1. Land sub-divided but not yet developed or recorded by planning board.
2. Farm land ‘for sale’ for urban purpose.
3. Land for non-farm ownership and
4. Farmland associated at higher than normal farm level as shown by local assessors.

Different scholars have attempted to analyze social characteristic of the fringe area, in this context Pahl (1965), had laid much focus on the social characteristic of the fringe and attempted to summarize the characteristic of the fringe under four categories:

1. Segregation
2. Selective immigration
3. Commuting and

A number of urban geographers have worked to find out the zone of urban influence on the basis of demographic and socio-economic criteria. Dikshit and Swanti (1968) , who have studied the influence of Poona city on its hinterland on the basis of
gradients shown by variables like; Bus service, Newspaper circulation, Commuting, supply and distribution of essential commodities, Post and telegraphs.

Another interesting work carried out by Carter (1972) analyzed that there are two aspects of rural urban fringe. First, there is a notion of the fringe as a distinctive area, primarily designated by characteristic land use association and secondly, there is a notion that social characteristics of the population of the fringe are intermediate between those of town and those of countryside. To analyze the influence zone of metropolitan region Alam and Khan (1972) delineated Hyderabad Metropolitan region on the basis of transport, commuting, population, retail trade, water supply, electric consumption, postal and telephone service, and five reflective factors – non-agricultural workers, electric consumption population variation, density and sex ratio. According to them the influence zone of this metropolitan city extends up to 40 miles from the centre of the city. The zonal structure also differs as it include; the metropolitan core, the peri-urban and rural hinterland. The region with the radius of 40 miles from the central city is designated as the region of metropolitan dominance. Lal (1973), in his study of Bareilly fringe has examined that the fringe is a significant development, but due to vagueness the areal definition of the term has not yet been standardized. However, the incoherent land use pattern, which occurs due to outward growth process of the city, may be taken as the representative of the fringe.

Hudson in (1973) has analyzed statistically the demographic characteristics of the suburban fringe of the nine Metropolitan Centers in the Middle East U.S.A. on the other hand Martin in the same year studied the spatial distribution of population, cities and suburbs, he laid much focus on entire metropolitan area for measuring the density
gradient in which he has found a tendency for population distribution over space to vary between city and suburbs.

To estimate the availability of facilities in the fringe area, M.M.P Sinha (1980), has divided the fringe zone into two sub zones.

1. Inner fringe or urban sub-urban fringe (USF) and
2. Outer or sub-urban rural fringe (SRF).

The inner fringe is an area just beyond the municipal corporation limit or political boundary of the city with a high value on the scale of urbanity. The zone gets almost all facilities of an urban centre. On the other hand, in the outer fringe the built-up area may be discontinuous, marketing facilities are partially available, percentage of cultivable land is much higher.

Geographers have studied the demographic characters of the fringe. Kulkarni and Thangoval in (1982) have studied the work of demographic and functional base of urban agglomeration and their outgrowth in Gujrat. They have evaluated demographic characters such as: Growth rate, Sex-ratio, Importance of agricultural versus non-agricultural activities and dominant function of these outgrowths. On the basis of these criteria they conclude that there is positive relationship between the transformation of agricultural to non-agricultural activity in the outgrowth with the size or class of the respective town. Larger the town greater will be its impact on the agricultural activity. Urbanization may bring about a change in rural economic structure and occupation, in this manner Syed khan (1983) in his paper, “the urban induced occupational diversification in rural areas of Aligarh district”. He laid stress on the fact that urbanization may bring about a change in rural economic structure and occupation. In
order to analyze its influence, the occupational structure and distance has been considered as the main criteria. As he opined, “the shift in different categories is used as a measure of occupational diversification”.

Demographic structure of a city invariably undergoes many changes which are attributed to socio-economic factors. This change does not only bring the change in the city but the surrounding areas also get affected. Sharma (1983) in this context Sharma had presented, “Spatial Pattern of Demographic Change in the Village around Guwahati City”. He opined that villages around the city are undergoing rapid change in demographic structure. Changes are visible in the field of vital rate of births, deaths, longevity as well as of marriage and family size, occupational and internal migration”. Dewey (1984), in his study of Milwaukee, first stated that it is only the movement of urban people into the rural urban fringe, but later on modified his statement that it is the movement of people from both rural and urban places. The people of rural origin are oriented towards agriculture but are trying to adopt the urban occupation and urban way of life.

Outmigration is closely associated with the socio-economic conditions of the fringe area in this matter Sita and Phadke (1985), in their work of delimiting the fringe of Bombay Metropolitan Region have used the demographic indicators such as population density, sex-ratio, growth rate and percentage of non-agricultural work force. They have studied 925 settlements. Sinha (1985), in his study of, “impact of urbanization of Dhanapur (Bihar) Township on the adjoining rural space” conclude that urbanization brings change in land use pattern from farm to non-farm uses.
Davis, Nelson, and Dueker (1994) conclude a Portland area case study by stating that “significant attitudinal and lifestyle differences separate exurbanites from suburbanites. Their findings reveal that “exurban rural” (unincorporated) areas have the highest rate of dual-income households and the lowest rate of households out of the workforce as compared to the suburban and exurban village households. Exurban rural area dwellers are also twice as likely as suburban workers to have blue-collar jobs.

Researchers have studied the impacts of the sprawl on its surrounding area; Orfield (1997) studied the negative impacts of urban sprawl from political and fiscal point of view. He conclude that it is not only the area that are experiencing sprawl but also in inner cities and inner ring suburbs that are losing population to further out suburban areas. On the other hand in the same year, Das, A. S. (1997), has delineated the rural urban fringe of Mysore city on the basis of distance, transportation, population density, literacy rate, population growth, sex ratio and ratio of non-agricultural workers. Burchell et al (1998) have studied the impact of urban sprawl and conclude that the three conditions that define the negative impacts of sprawl – leapfrog development, low density and unlimited outgrowth expansion – are the same as those that define the positive aspects of sprawl. Nelson and Sanchez (1999), have uncovered many similarities as they examine household characteristics, workers occupations, employment, accessibility and residential characteristics of suburbanites and exurbanites. The statistically significant difference between the two groups, they note, are more a function of location than of systematic differences in household demographic or occupation.

The fringe has become the catch path for everything as discussed by Peiser (2001) that is bad about urban growth today – congestion, blight, monotony, endless
development and ecological destruction. He has made clear cut difference between those aspects which are associated with the sprawl from those which are not. Flores and Irwin (2004) have studied the phenomenon of sprawl in Ohio country using parcel – level data on the residential land use change. They have analyzed the rural to urban land conversion and sprawl. The findings indicate that location of new residential development is influenced by preference for lower density areas that nonetheless are closer to existing urban development.

The shape of the fringe belt varies from town to town, based on the physical, cultural, and economic personality of the town. Its shape is always changing in communication facilities. It is a process which helps to change the rural countryside into urban units. As the urban centre expand, the fringe belt does not remain static, it goes dynamically converted into a rural urban fringe and then merge with the parent urban centre. Mahon (2005), has studied the fringe areas in West of Ireland (Lakeside, Riverview and Woodland) and tried to identify the places situated in the urban fringe, particularly in context of rapid economic and social change taking place therein. His main focus was upon the direct accounts of residents as the basis for establishing these understanding and perception, including those related to rural and urban was discussed. Qvistrom and Saltzman (2006), they have studied the inner fringe of Malmo in Southern most Sweden. They have laid emphasis on landscape dynamics and on interaction between spatial plans and every day activity as the key to understand the landscape at inner fringe. They have also studied the problems regarding the handling of ephemeral and transitory aspects within spatial planning.
Clark and Sharp (2008), have studied the rural urban fringe of Ohio in relation with suburbs and rural areas. They have also examined the series of sequentially related contrasts that illuminate characteristics of rural urban fringe. They have analyzed the fringe in terms of ecological, occupational and socio-cultural aspect in order to determine the extent to which the fringe is similar to or dissimilar from the suburbs or rural areas and conclude that rural urban fringe differs from urban and suburban places, and inner portion of fringe has urban dominance than on outer portion.

The change in socio-economic pattern of the fringe area depends upon the intermediate demand from city, Khan, N. et al. (2011), have analyzed the emergence of livestock farming in the rural urban fringe of Aligarh city as there is the large demand of meat and milk in the city. Livestock husbandry is highly remunerative providing high income, living standard, food nutrition and health standard. Improvement in disposable income, change in food habits from vegetarian to non-vegetarian and social transformation are the important driver of the revolution in this sector in fringe area.

2.1.4 Fringe and Future Planning.

Sprawl is a term that is often used to describe perceived inefficiencies of development, including disproportionate growth of urban areas and excessive leapfrog development. Rapid urban development is a phenomenal in many developing countries, resulting in dynamic change of landscape. The measurement and monitoring of land use change are crucial to government officials and planners who urgently need updated information and proper planning tools. Sprawl is a cumulative result of many individual decisions and it requires not only an understanding of the factors that motivate an individual landowner to convert land, but also an understanding of how these factors and
individual land use decisions aggregate over space. Some of the causes of the sprawl include - population growth, economy and proximity to resources and basic amenities. Through much of developed and developing world one of the central concern for the planners to manage the expansion of urban area into countryside to prevent the negative impacts of such a degradation of natural ecosystem, loss of productivity agricultural land and reduction of landscape amenity.

As the continued growth in exurban region creates a range of demand and conflicts which requires policy responses, either at local or from higher levels of government. An empirical work carried out by McKenzie (1997 has highlighted the rural exurban policy and policy responses in Australian context. He also analyzes some difficulties in dealing adequately with exurban development. He conclude that in order to achieve effective exurban policy, policy maker need to bitterly understand the dynamic and long-term impacts of exurban development, as well as appreciate how metropolitan policies may influence the nature of this development. In leapfrogging developers skip over properties to obtain land at lower price further out inspite of absence of utilities and infrastructure. In order to overcome the consequences of leapfrogging, Heim (2001) has identified and discussed two programs: Development impact fees to help pay for infrastructure cost of new development and an infill Housing Program to encourage residential development on vacant land. To great extent these two programs had worked. Urban growth has many impacts environmental of the sprawl, Johnson (2001) has shown that urban sprawl is agreed to have a set of specific environmental impacts that vary according to the stakeholder group affected, the immediacy of human risk and the aesthetic verses physical effects, and some of these effects may be meaningful to ordinary
citizen. However there is less information on how relative levels of these impacts ought to be expressed in such a way that these are understandable to the policy at large as well as policy maker and analysts.

Bunker (2002), concerned with establishing what provisions existed in regard to the rural–urban fringe in the series of metropolitan plans developed (for Sydney, Melbourne, Perth and Alidade) during the 1950s in Australia these were important as the first significant statements regarding the future development and character of most of the state capitals. Some of the principles enunciated in them regarding the rural–urban fringe, and some of the instruments formulated to implement them are still current today, although there has been much evolution, enrichment, modification and addition to the original proposals made then.

Urban growth has negative impacts on the land use pattern of the surrounding area in this context, Paul and Tonts (2005) have studied the impact of urban growth on rural area in Metropolitan region of Barcelona. They have focused on the consequences of urban sprawl particularly on agricultural land. In order to overcome these consequences it is better to implement considerable debates, strategies, plans regarding the role of spatial planning in influencing general land use trend. Their main aim was to explore the apparent link between urban sprawl, spatial planning and changing land use pattern in rural urban fringe. The measurement and monitoring of land use change are crucial to government officials and planners who urgently need updated information and proper planning tools to analyze the view, Gallent and Anderson (2007) are concerned with the rural urban fringe with the ‘physicality’ of ‘edge landscape’ and the way they are sometimes represented. However, intervention that seeks to beautify these areas are often
guided by misrepresentation. It also depicts how industrial and functional landscapes are frequently subject to neglected representation. They have examined balance between the need for possible physical intervention at the fringe and the possibility of rethinking the fringe and the relationship between the aesthetic and functionality of landscape. Another interesting work is done by Gallent and Shah (2007), have laid the emphasis on spatial planning, area action plans in rural urban fringe, as the rural urban fringe has called ‘planning’s last frontiers’, and it is a frontier that is now receiving great attention from policy makers. They offer a potential means of bridging the gap between the ideas of spatial planning and the need for co-ordination, transformative and integrative action on the ground, which enables the decision makers, planners to think about and manage the rural urban fringe in a more holistic way.

2.1.5 Review of Literature through GIS and Remote Sensing Techniques.

Urbanization has caused many environmental impacts associated with the reduction and conversion of green space. The change in land use/land cover pattern of a region is associated with the natural and socio-economic factors and their utilization by man in time and space and has become a central component in current strategies for managing natural resources and monitoring environmental changes. Rural urban fringe signifies both urban and rural characteristics. The nature of fringe, as it neither purely resembles with the town characters nor with rural characters and the same time corresponds to both. The better way to identify the dynamic nature of fringe area is in terms of social, cultural, demographic and land transformation at different time periods. Therefore to acquire current information of the changing scenario of rural urban fringe for effective management of social, cultural, demographic and land transformation GIS
and remote sensing provides the platform for detecting the changes occurring in the rural urban fringe of city.

Urbanization takes place either in radial direction around a well-established city or linearly along the highways. This dispersed development along highways, or surrounding the city and in rural countryside is often referred as urban sprawl. The expanding networks of roads and increasing reliance on the automobile, population began shifting from cities to fringe. The recent technologies like GIS and remote sensing helps in identifying the pattern of growth and its rate. Mapping urban sprawl provides a "picture" of where this type of growth is occurring and to suggest the likely future directions and patterns of sprawling growth. However only a few studies were attempted to establish the inter relationship between the road transport development and Land use changes in rural urban landscape at a micro level.

The increasing use of Satellite Remote Sensing for civilian use had proved to be the most cost effective means of mapping and monitoring dynamic nature of rural – urban fringe. Data can be obtained as frequently as required to prove information for determination of quantitative and qualitative changes in the fringe area. The ever increasing population is increasingly changing land use pattern in the fringe area from agriculture use to urban uses. For better management of the rural urban fringe, the change in land use in the fringe and the rate of change in the land use pattern should be investigated.

Haack et al. (1987), with an enhanced spatial resolution of 30m, Landsat Thematic Mapper (TM) data may be successfully utilized to map land use at the urban-rural fringe. After classifying land covers around Miami, Florida into water, non-forested
wetland, agricultural and residential/commercial, found that TM data do not always lead
to more accurate results than MSS in mapping these urban and near-urban covers if they
are less homogeneous.

To analyzed the capability of SPOT multispectral (XS) imagery for providing
information on rural to urban conversion, Martin and Howarth (1989) have shown the
visual interpretation of SPOT images for change detection and supervised classification
of multi-date images providing the best overall classification accuracy at approximately
80 per cent. The best change detection accuracy of 60 per cent was achieved with
supervised classification of multi-date images. Change/no change accuracy are greater
than 90 per cent. Gastellu-Etchegorry 1990; An assessment of SPOT XS and Landsat
MSS data for digital classification of near-urban land cover with a spatial resolution of
10m for the panchromatic band and 20m for the XS bands, SPOT data are commonly
used to produce land cover maps at the urban-rural fringe

Another interesting work done by Goong and Howarth (1990) in their study, ‘the
use of structural information for improving land-cover classification accuracy at rural
urban fringe’, have reported an accuracy of 76.6 percent for mapping 12 classes of land
cover at the rural urban fringe of Metropolitan Toronto, Canada. The marginal high level
of accuracy achieved in this are attributed to the presence of a large water body inside the
study area having a unique spectral characteristic, water is usually classified with the
higher accuracy or 100 per cent in this case. Treitz et al. (1992) have studied the rural
urban fringe of Toronto, Canada, took advantage of the 10m resolution of the
panchromatic band by registering it with the multi-spectral ones. An accuracy of 78 per
cent was achieved in a classification of eight land covers at the urban- rural fringe of
Toronto, Canada. However, no research has been carried out to comprehensively assess the factors affecting the capability of SPOT XS data and to examine the role of seasonality in mapping detailed land covers at the urban-rural periphery.

In order to identify the growth of the urban area, Charbonneau et al. (1993) used three Landsat MSS images to monitor the urban expansion of Montreal, Canada. The results derived from automatic classification of the data were 5-30 percent more accurate than governmental statistics. From Landsat TM imagery Harris and Ventura (1995) achieved an accuracy of 77 per cent in a five-category (residential, commercial, industrial, open spaces and freeways) classification for the small urban area of Beaver Dam, Wisconsin.

Urban growth also leads to the scattered growth in the surrounding areas in this context Yeh and Li (1998), have studied the urban sprawl of Pearl River Delta, China. The region has witnessed wide leapfrog development due to lack of proper planning and management. TM satellite images of different dates were used to estimate the amount of urban expansion and to measure and compare the spatial pattern of urban sprawl. They have used the entropy method to measure and monitor the urban sprawl by the integration of remote sensing and GIS. They have suggested an urgent need to control such development pattern so that future economic growth in the region can be sustained.

In order to analyze the capability of SPOT multispectral data in generating detailed land cover map at the rural urban fringe in different seasons Gao and Sillcorn (1998), have studied the rural urban periphery of Auckland, New Zealand, two images were used to map ten categories of land cover at level II of the Anderson scheme, with an overall accuracy of 72.6 per cent and 81.4 per cent from the winter and summer
data respectively. The high accuracy in summer image was achieved because of distinctiveness of vegetative cover in summer. These images have identified the high heterogeneity of land use pattern commonly found at the urban periphery.

Nigam (2000), has studied the rural urban fringe of Enscheda City Netherland has evaluated the effectiveness of high resolution satellite data and computer aided GIS techniques in accessing the land use change dynamics from 1993 to 1998. In order to obtain information regarding the dynamic nature of rural urban fringe of the city, the COSMOS data (merged with TM) of 1993 and IRS PAN Data (merged with LISS-III) development. The results have shown that during this period a high magnitude of land use was changed into residential and industrial land uses and the crop land was also changed into construction sites.

Detected the urban growth as a change of non-build pixels to build pixels data Gluch (2002) by using two types of texture analysis is at the super pixel (3×3 pixel) level. She has utilized a user-defined threshold to determine whether a super-pixel is classified build or un-build. Although she used both SPOT-PAN and Aerial photos and noticed that SPOT-PAN alone would be sufficient to distinguish built from non-built features through texture analysis.

The outward growth of the city had its great impact on the land use pattern of the fringe area, in this matter Turker and Asik (2002), have studied the overall land use change ay urban fringe through analysis of multi-temporal Landsat Thematic Mapper (TM) images in Batikent, Ankara (Turkey). Seven land-use change classes were detected through a multi-date classification of Landsat TM images obtained in 1985 and 1995 with an overall accuracy of 80.9 per cent. The main aim of their study was: (a) to detect the
overall land use change through a digital change detection technique; (b) to obtain quantitative information about each land-use change type in terms of both gains of the urbanized region, specifically in urban land use categories and also loss in the natural area; and (c) to identify the development trend at urban fringe in the north west of Ankara. Epstein et al (2002) have evaluated the traditional unsupervised classification and proposed GIS buffering approach for mapping the suburban sprawl and also discussed the problems associated with the classification of urban classes (built-up) in comparison with rural and urban categories.

A sample have been proposed, automated method by Kim, Lib and Gong (2004), to detect rural urban land use change of Ho Chi Minh City in Vietnam by testing a new algorithm that provides detailed classification using SPOT-PAN images alone. The proposed method has two tasks: (a), classification of images as either urban or rural at a relatively high level of spatial detail (pixel level) in order to include the classification of house made of natural material, and (b) classification of image comparison of two different dates by over lying them to detect change from rural to urban land use during the corresponding period. They conclude that, it has a potential to be useful to researchers and policy makers in the developing world where there has been a dearth of about the rapid urban growth patterns that have developed during the last decade of the 20th century. An accuracy of 82.31 per cent was achieved for the final change map.

The expansion of the city brings so many changes in the surrounding areas, in this connection Jianjun et al (2005), have studied the land cover in rural urban fringe interaction of Xi’an region using Landsat TM/ETM data and Artificial Neural Network (ANN) while applied to analyze the expansion of the city of Xi’an land use land cover
change of its surrounding area between 2000 and 2003. Supervised classification and Normalized Differences Barren Index (NDBI) were used respectively to retrieve its urban boundary. Results showed that the urban area increased by an annual rate of 12.3 per cent. Population immigration from countryside, great development infrastructure is main causes for rapid urban development.

Another work in this regard was carried out by Kumar, Pathan, and Bhandari (2007), Have made an attempt to monitor the urban growth over a period of time and its consequences on fringe area by employing GIS and remote sensing techniques in connection with Shannon entropy. The growth of built-up land has been divided into four zones. In each zone the percentage of density of urban built-up was calculated for different periods, later on entire study area was also divided into concentric circles of the city employing GIS technique. This was integrated with zone wise road density to study the impact of infrastructure development on the urban growth. The result has shown that the development of urban built-up land is sparse and leading to haphazard urban growth in the city particularly in the fringe area.

Jat, Garj and Khare (2008), have studied the urban sprawl of Ajmer City over the period of 25 years (1977 – 2002). The statistical approach has been used for the classification of remotely sensed images obtained from various sensors viz. Landsat MSS, TM, ETM+ and IRS LISS III. The Shannon’s entropy and landscape (patchiness and density) have been computed in terms of spatial phenomenon, has been used. The results reveal that land development (160.8) per cent in the Ajmer was more than three times the population growth (50.1) per cent.
Urban growth has its impacts on the land use/land cover change of the fringe area in this connection Hadeel et al (2009), have studied land use cover and land use change in southern parts of Iraq (Basrah Provinces) by using a 1:250000 mapping scale. Remote sensing and GIS software were used to classify Landsat TM in 1990 and Landsat ETM+ in 2003 imagery into five land use and land cover classes: vegetation, sand, urban area, unused land and water bodies. The results depict that large vegetation area in north and southeast were converted into urban land contraction. Rapid development of urban economy and population immigration from countryside and returning farm land to transport and huge expansion in military campus were the main causes for land use and land cover change.

Urbanization leads to the conversion of land use in the fringe area in this matter Addo (2010) has studied the farm land change in urban and peri-urban areas of Ghana Accra region. A number of methods that differ in approach, cost and duration have used to meet the demand for high accuracy in urban farmland mapping such as physical survey, Digitizing photogrammetric and remote sensing, and has shown an edge of GIS and remote sensing over other methods to identify the changes in farmland. He conclude that the information obtained from these methods will not only help in farmland monitoring but also in developing sustainable policies to effectively manage urban farming practices in Accra. Saravanan and Ilangoovan (2010), have studied the nature and pattern of urban expansion of Madurai City over its surrounding region during the period of 1991-2006. The satellite data Landsat TM (1991) and Landsat ETM+ (2006) images were used to identify the expansion of urban sprawl. Rural urban fringe was fragmented
into two zones namely Ring- I and Ring- II on the basis of its proximity. They have indicated that road transport was solely responsible for the rapid urban development.