

A LITERATURE SURVEY ON RURAL URBAN FRINGE

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ABSTRACT

Rural urban fringe is the most dynamic area lying between the city and rural area. The dynamic nature of the fringe can be detected by observing the changes in the city and vice versa. The changes at rural urban fringe depend up on the function and size of the city. The shape of the fringe belt varies from city to city, based on the physical, cultural, and economic personality of the city. 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 center expand, the fringe belt does not remain static, it goes dynamically converted into a rural urban fringe and then merge with the parent urban center. 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. Urban encroachment is one of main problem prevailing in the environment of rural urban fringe. The urban impact has not only changed the socio-economic and demographic profile of the rural urban fringe but also the land use pattern of the area.

KEYWORDS: Fringe, Geographic Information System and Remote Sensing, Dynamics, Linkage, Urban Encroachment, Land Use, Planning.

INTRODUCTION

In this paper an attempt has to make a literature survey on different aspects of rural urban fringe such as identification of fringe, its linkage, characteristics, and regarding the future planning of the 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. In addition to this it also facilitates the identification of research problem and the formulation of the objectives and methodology of the study. The review of literature on rural urban fringe has been broadly divided on five categories:

A. Identification of 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 till (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, has tried to distinguish between the urban fringe and rural urban fringe. 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 USA as 'Institutional Desert' and 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 center. Balk (1957), has 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'. Garnier and Chabot (1967) have tried to identify the suburbs on the basis of built-up area. 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". Wissikn (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.

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.

On the basis of land use composition and data related to census, Prayor (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

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

Commercial strips development and large expansion of low density or single use development – as well as by many indicators as low accessibility and lack of functional open space.

B. 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, Alix (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.

Greater the nearness to the town or city of a village greater be its impacts in this manner Walter Fierly (1946) has considered accessibility as the basic factor responsible for the fringe development. He opined that “the urban 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. Dickson (1947), while elaborating the city region

concept, he opined that an urban, on the one hand, centre 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.

The villages does not abruptly gets converted into urban area but it a stage wise process, in this matter Ramchandran (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.

Another work, limited to single city region is on Delhi metropolitan region by Nangia (1976), 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 Rao 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), 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".

Padki 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. 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.

C. Characteristic features (socio-economic, demographic, and change in land use pattern)

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. Shalter (1940), in his study of Land use classification along the Rural Urban Fringe has called it as mixture of land use. Both the farm and non-farm land use patterns are found in it.

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 concluded that "the build-up area advances unevenly into its surrounding countryside and the rural – urban fringe is pushed before it on to new areas".

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.

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; On the basis of its characters Conzen (1960), he divided the fringe into 'Proximal' and 'Destal'

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.

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.

In order 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 of zone of this metropolitan city extends up to 40 miles from the centre of the city.

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.

Different 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. Syed khan (1983) 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 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".

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.

Different 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 Bruchel 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.

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.

Qvistrom and Saltzman (2006), they have studied the inner fringe of Malma 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 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.

D. GIS and Remote Sensing Technique.

In order 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.

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.

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. 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. 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.

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 per cent 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 Li and Yen (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 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 using 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.

Gulch (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.

Turker and Asik (2002), have studied the overall land use change at urban fringe through analysis of multi temporal Landsat Thematic Mapper(TM) images in Betaken, 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 caters.

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. 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.

Another work in this regard was carried out by Kumar, Pathan, and Bhanderi (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 Ajmeer 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 Ajmeer was more than three times the population growth (50.1) per cent.

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 Ilangovan (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.

E. Fringe and future planning

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.

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 and concludes 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. 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. 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, 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.

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. Gallen 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.

CONCLUSION

The literature survey on rural urban fringe reveals it is a very dynamic in nature in its all aspects. It gets change with the change it city. The review of literature has been arranged in a very systematic order. It has helped to understand the definitions of fringe, its linkage with the city, the socio-economic characteristics of the fringe, the role of GIS and Remote Sensing in assessing its dynamic nature and finally the suitable policies for its better planning.

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